WATER SUPPLY OUTLOOK

KOOTENAI RIVER BASIN

MONTANA

as of

MAY 1, 1967

UNITED STATES DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

Data included in this report were obtained in cooperation with other Federal, State and private organizations

The snow pack is presently about 50 percent above average and about 70 percent more than last year at this time. The water content of the snow is generally maximum of record for this date with many records going back to the early 1930's. Others are second to fourth highest of record.

Streamflow for the next five months is forecast 130 to 140 percent average and generally near the high volumes produced in 1954 and 1956. Warm temperatures and rain during the main melt period could cause streams to leave their banks. Those persons living in the areas where previous flooding has occurred might be prepared should these conditions develop.

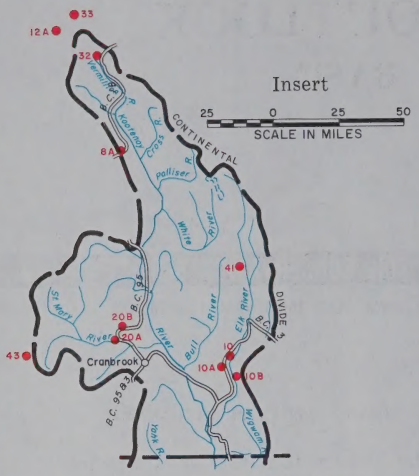
STREAMFLOW (APRIL THROUGH SEPTEMBER)

STREAM GAGING STA.	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1948-62 Average	1963	1964	1965	1966
STATION NO. 3020 FISHER RIVER NEAR JENNINGS				342	264	250	440	271	486	286	210	383	274	291	257	318	162	264	302	
STATION NO. 3030 KOOTENAI RIVER AT LIBBY	9630	5952	8416	9686	7268	7359	10425	7370	9664	6855	6431	9666	7384	8688	6644	8096	7058	7820	8043	

Report prepared by
U. S. DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE
SNOW SURVEY AND WATER SUPPLY FORECASTING UNIT
BOX 98, BOZEMAN, MONTANA 59715

"The Conservation of Water begins with the Snow Survey"

KOOTENAI RIVER BASIN



LEGEND

- Snow Survey Course
- Soil Moisture Station
- Snow Course and Soil Moisture Station
- Aerial Marker at Snow Course
- Stream Gaging Station
- Drainage
- S.W.C.D. Boundary
- Watershed Boundary
- Highway
- Town
- County Boundary
- State Boundary

See Insert

C A N A D A

I D A H O

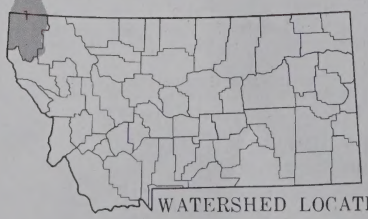
L I N C O L N

F L A T H E A D

L I N C O L N S. W. C. D.

Yaak River
Yaak
U.S. 93
3050
3045
Troy
Libby
3030
KOOTENAI
Libby Creek
Fisher
Wolf
Creek
3020
Happy Inn
River
15A02
U.S. 2
15B11
15B16
15B15
Warland
MONT. 37
RIVER
15A01
Rexford
3013
Eureka
Tobacco
River
14A07
14A11
14A10
14A04
U.S. 93

10 0 10
SCALE IN MILES



WATERSHED LOCATION

SNOW SURVEY DATA

WATERSHED 1

AS OF MAY 1, 1967

(Inches)

SNOW COURSE			CURRENT DATA			PAST RECORD	
						WATER CONTENT	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE
15B11	Baree Creek	5500	5/1	149	62.6	41.0	49.1
15B16	Baree Midway	4600	5/1	116	49.9	24.8	-
15B15	Baree Trail	3800	5/1	12	4.2	0.0	-
14A04	Brush Creek	5000	4/26	38	15.0	7.2	10.7*
BC 10	Fernie	3500	4/28	19	6.3	0.3	2.8
BC 12A	Field	4200	4/28	17	5.9	0.0	0.6*
BC 11	Glacier	4100	4/28	94	45.2	31.6	25.9
14A11	Graves Creek	4300	5/2	56	24.0	12.8	-
BC 43	Gray Creek	5100	4/28	76	27.5	21.7	20.2
BC 33	Kicking Horse	5400	4/28	61	21.3	14.0	12.2
BC 20B	Kimberley	3800	4/29	6	1.9	0.0	1.2*
BC 32	Marble Canyon	5000	4/28	44	18.1	8.2	13.4
BC 10B	Morrissey Ridge	6100	4/28	115	39.0	-	-
BC 10A	New Fernie	4100	4/28	46	18.0	-	6.0*
15A01	Red Mountain	6000	4/27	65	27.4	19.6	20.9
BC 8A	Sinclair Pass	4500	4/27	22	7.0	1.6	2.2*
BC 20A	Sullivan Mine	5100	4/27	50	19.8	13.0	12.5
BC 41	Upper Elk River	4400	4/30	13	4.1	0.0	2.5*
14A07	Weasel Divide	5450	5/2	109	50.8	29.6	35.7*

SOIL MOISTURE DATA

AS OF MAY 1, 1967

(Inches)

SOIL MOISTURE STATION			SOIL PROFILE		CURRENT DATA		PAST RECORD	
NO.	NAME	ELEVATION	DEPTH	FIELD CAPACITY	DATE OF SURVEY	SOIL MOISTURE	LAST YEAR	**AVERAGE
15B15M	Baree Trail	3800	48	7.5	5/1	6.6	7.2	-
14A10M	Murphy Lake R.S.	3000	48	22.6	5/1	22.5	21.4	-
15A02M	Raven R.S.	3050	48	23.0	5/2	22.2	21.8	-

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD). *ADJUSTED AVERAGE **AVERAGE FOR PERIOD OF RECORD

WATER SUPPLY FORECASTS

WATERSHED 1

AS OF MAY 1, 1967

(1000 Acre Feet)

NO.	RIVER AND FORECAST POINT	FORECAST PERIOD	FORECAST THIS YEAR	PERCENT AVERAGE	MEASURED FLOW LAST YEAR*	MEASURED FLOW AVERAGE
	FISHER RIVER					
3020	Jennings (near)	May-Sept	300	129	165	223
	KOOTENAI RIVER					
3030	Libby (at)	May-Sept	9,600	129	7,231	7,428
	YAAK RIVER					
3045	Troy (near)	May-Sept	610	140	429	435
	KOOTENAI RIVER					
3050	Leonia (at)	May-Sept	10,950	130	8,172	8,416

*PROVISIONAL DATA FURNISHED BY U.S. GEOLOGICAL SURVEY

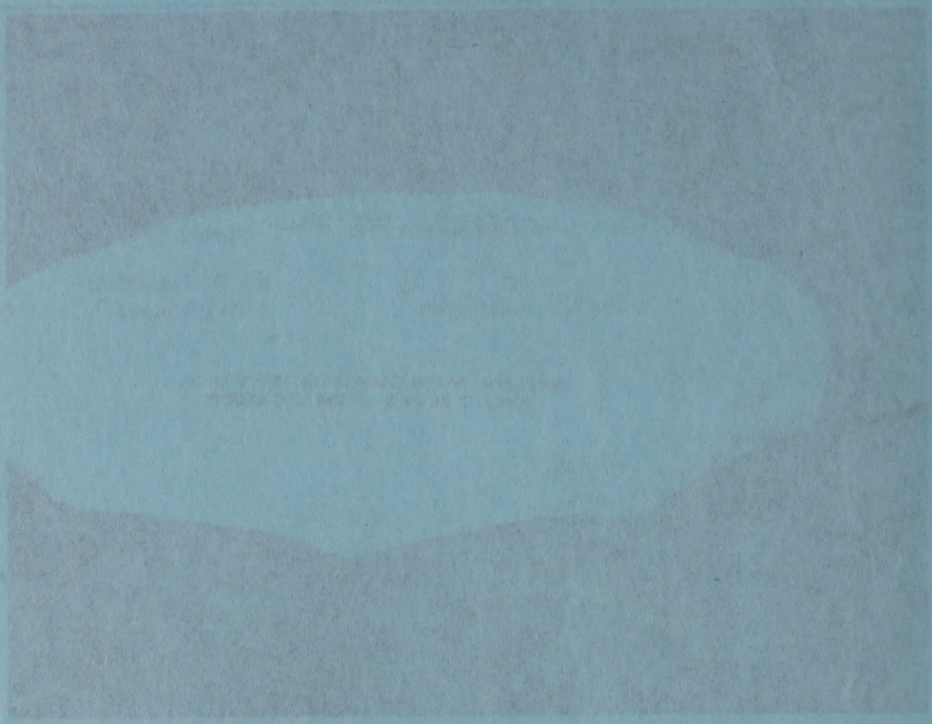
NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD).

THE SNOW PILLOW

Snow Pillow installation at Lick Creek, Montana

During the past few years the Soil Conservation Service has tested snow measuring devices for obtaining a continuous record of snow accumulation and melt. The most versatile and promising is the nylon reinforced butyl or neoprene snow pillow, which is usually about 12 feet in diameter and filled with a methanol alcohol-water solution to a depth of three inches. The pillow is placed on a level ground surface. A hose connects the pillow to a manometer or pressure transducer in an instrument shelter. As snow falls on the pillow the amount of fluid rise in the manometer is equivalent to the water content in the snow pack. A water level recorder installed in the manometer provides a continuous record of the snow water content. Telemetered (transmitted by radio signal) information is obtained by connecting a pressure transducer to the pillow. The signal from the transducer is converted to equivalent inches of water content at the receiving station. Air temperature, total precipitation, soil moisture and soil temperature can be telemetered, in addition to snow water content.

USDA-SCS-PORTLAND, OREG. 1967



WATER SUPPLY OUTLOOK

FLATHEAD RIVER BASIN

MONTANA

as of

MAY 1, 1967

UNITED STATES DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

Data included in this report were obtained in cooperation with other Federal, State and private organizations

Water contained in the mountain snow pack is presently about 40 percent larger than average and 75 percent more than a year ago. Below average temperatures and good mountain snowfall during April has resulted in many snow courses showing the largest May 1 water content of record and others the second to fourth largest.

Streamflow for the next five months is forecast 130 to 140 percent average. The volumes forecast for this spring were exceeded only in 1954 on the Middle and North Forks, and in 1959 on the South Fork and Swan. Streamflow will be high for a long period as the large snow pack melts. A combination of warm temperatures and prolonged rainfall could cause some streams to leave their banks. Hungry Horse Reservoir has been lowered considerably and will help reduce flows in the Flathead during the melt period.

STREAMFLOW (APRIL THROUGH SEPTEMBER)

STREAM GAGING STA.	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1948-62 Average	1963	1964	1965	1966
STATION NO. 3630 FLATHEAD RIVER AT COLUMBIA FALLS	6837	5331	7749	7225	5732	6522	8267	5707	7164	5716	5053	8053	5888	6232	5978	6497	4937	7398	7418	
STATION NO. 3700 SWAN RIVER NEAR BIG FORK	841	514	807	686	619	604	676	570	750	575	568	997	724	707	771	694	533	706	844	

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SNOW SURVEY AND WATER SUPPLY FORECASTING UNIT
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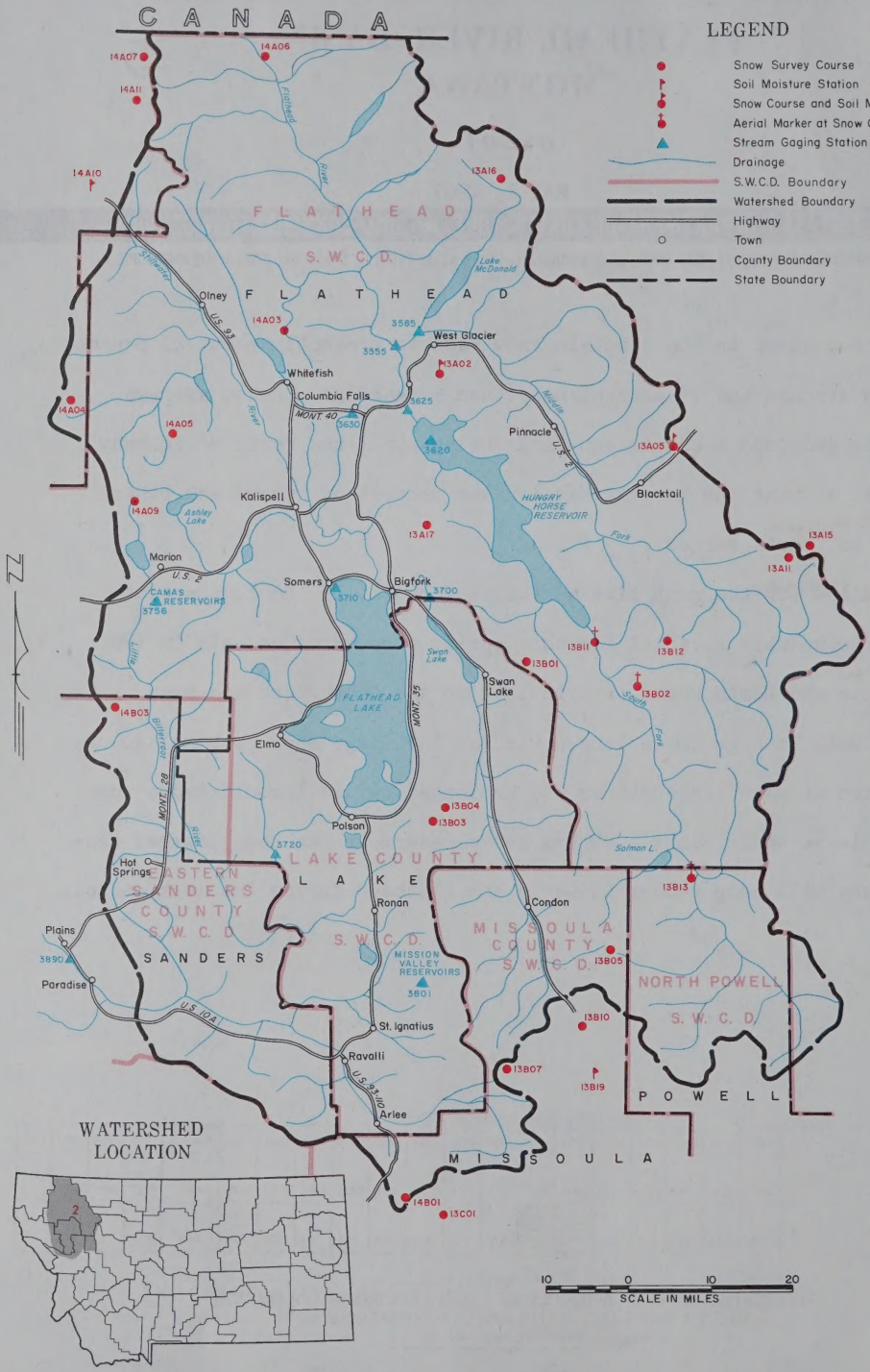
"The Conservation of Water begins with the Snow Survey"

FLATHEAD LAKE RIVER BASIN



MT-2b

SNOW SURVEY DATA

WATERSHED 2

AS OF MAY 1, 1967

(Inches)

SNOW COURSE			CURRENT DATA			PAST RECORD	
						WATER CONTENT	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE
13A15	Badger Pass	6900	5/4	120	50.4	37.1	-
14B03	Bassoo Peak	5150	5/1	37	13.8	7.8	9.7*
13A11	Beaver Lake	5900	5/4	86	36.4	20.2	-
13B03	Big Creek	6750	5/2	137	61.4	39.6	50.5*
14A04	Brush Creek	5000	4/26	38	15.0	7.2	10.7*
13A17	Camp Misery	6400	4/28	153	66.1	41.0	52.0*
13B10	Coyote Hill	4200	5/3	19	7.0	0.4	2.3
13A02	Desert Mountain	5600	5/1	45	19.7	10.3	14.6
13B04	Fatty Creek	5500	5/2	80	33.7	19.0	22.5*
BC 10	Fernie	3500	4/28	19	6.3	0.3	2.8
14A11	Graves Creek	4300	5/2	56	24.0	12.8	-
14A09	Griffin Creek Divide	5150	5/1	39	15.8	3.8	9.8*
13B12	Gunsight Lake	6300	5/4	132	58.5	41.6	-
14A03	Hell Roaring Divide	5770	5/3	95	45.4	29.4	31.5
13B13	Holbrook	4530	5/5	21	9.8	0.0	1.4*
14A05	Logan Creek	4300	4/26	25	8.4	0.0	3.4*
13A05	Marias Pass	5250	4/26	63	25.9	14.0	18.0
13A16	Mineral Creek	4000	5/1	53	23.2	9.4	-
BC 10B	Morrissey Ridge	6100	4/28	115	39.0	-	-
BC 10A	New Fernie	4100	4/28	46	18.0	-	6.0*
13B07	North Fork Jocko	6330	5/3	136	59.0	36.2	48.0*
13B02	Spotted Bear Mountain	7000	5/5	46	21.6	9.2	12.4*
13C01	Stuart Mountain	7400	4/30	95	40.3	28.6	30.4*
13B01	Trinkus Lake	6100	5/5	126	61.8	41.4	45.4*
14B01	TV Mountain	6800	4/29	61	22.5	17.6	20.3*
13B11	Twin Creeks	3580	5/5	14	7.2	0.0	1.4*
13B05	Upper Holland Lake	7000	5/5	111	50.6	34.8	39.0*
14A07	Weasel Divide	5450	5/2	109	50.8	29.6	35.7*

SOIL MOISTURE DATA

AS OF MAY 1, 1967

(Inches)

SOIL MOISTURE STATION			SOIL PROFILE		CURRENT DATA		PAST RECORD	
NO.	NAME	ELEVATION	DEPTH	FIELD CAPACITY	DATE OF SURVEY	SOIL MOISTURE	LAST YEAR	**AVERAGE
13A02M	Desert Mountain	5600	54	8.4	5/1	8.2	9.6	8.5
13A05M	Marias Pass	5250	54	6.5	5/1	5.8	-	6.0
14A01M	Murphy Lake R.S.	3000	48	22.6	5/1	22.5	21.4	-
13B19M	Seeley Lake	4030	48	11.9	5/2	11.8	11.6	11.8

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD). *ADJUSTED AVERAGE **AVERAGE FOR PERIOD OF RECORD

WATER SUPPLY FORECASTS

WATERSHED 2

AS OF MAY 1, 1967

(1000 Acre Feet)

NO.	RIVER AND FORECAST POINT	FORECAST PERIOD	FORECAST THIS YEAR	PERCENT AVERAGE	MEASURED FLOW LAST YEAR*	MEASURED FLOW AVERAGE
	NORTH FORK FLATHEAD RIVER					
3555	Columbia Falls (near)	May-Sept	2600	142	1683	1833
	MIDDLE FORK FLATHEAD RIVER					
3585	West Glacier (near)	May-Sept	2300	132	1547	1736
	SOUTH FORK FLATHEAD RIVER					
3625	Columbia Falls (near)(7)	May-Sept	2720	129	1723	2103
	FLATHEAD RIVER					
3630	Columbia Falls (at)(7)	May-Sept	7760	133	4955	5820
	SWAN RIVER					
3700	Big Fork (near)	May-Sept	800	133	502	599
	FLATHEAD RIVER					
3720	Polson (near)(8)	May-Sept	9310	134	5949	6914

(7) Adjusted for storage in Hungry Horse Reservoir.
(8) Adjusted for storage in Hungry Horse Reservoir and Flathead Lake.

*PROVISIONAL DATA FURNISHED BY U. S. GEOLOGICAL SURVEY

RESERVOIR STORAGE DATA

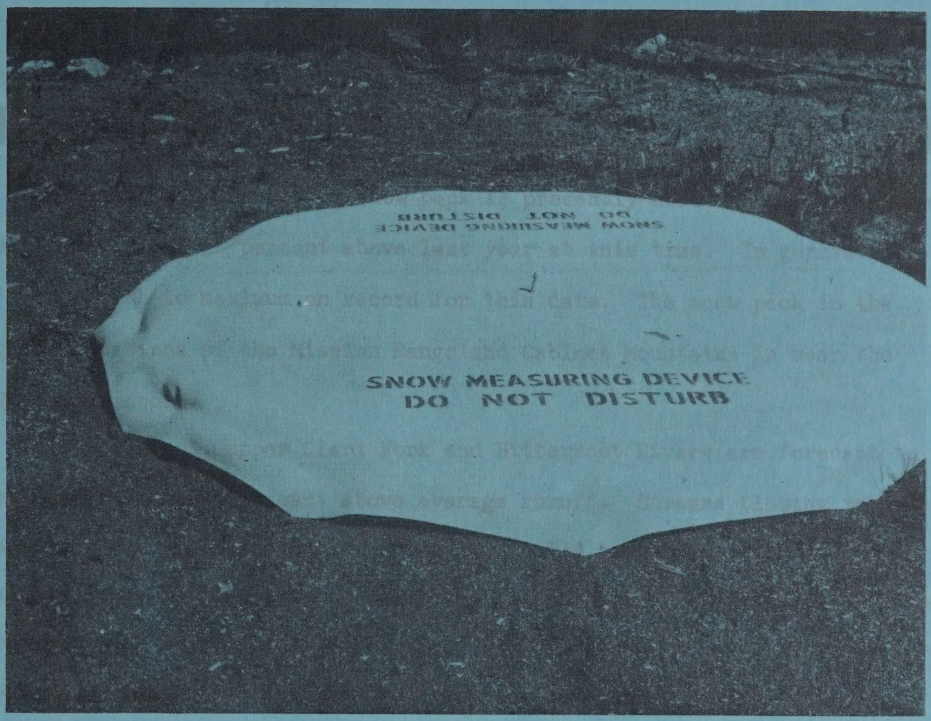
AS OF APRIL 30, 1967

(1000 Acre Feet)

NO.	RESERVOIR	USABLE CAPACITY	THIS YEAR	LAST YEAR	AVERAGE
3620	Hungry Horse	3,428.0	1,333.0	2,437.0	2,097.0
3710	Flathead Lake	1,791.0	816.1	818.5	968.0
3756	Camas (4)	45.2	39.5	35.4	38.1
3801	Mission Valley (8)	100.3	25.5	71.8	45.1

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD).

THE SNOW PILLOW



Snow Pillow installation at Lick Creek, Montana

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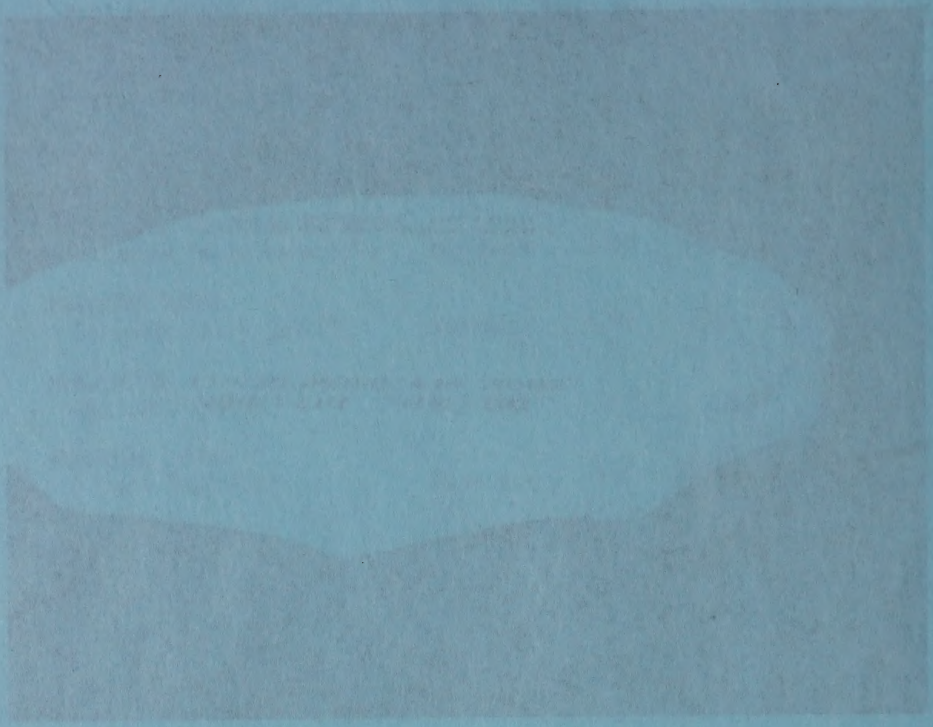
USDA-SCS-PORTLAND, OREG. 1967



WATER SUPPLY OUTLOOK

LOWER CLARK FORK RIVER BASIN

MONTANA

as of

MAY 1, 1967

UNITED STATES DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

Data included in this report were obtained in cooperation with other Federal, State and private organizations

The water content of the snow pack is presently about 25 percent above average and about 60 percent above last year at this time. In general, it is from fourth to maximum on record for this date. The snow pack in the higher elevations of the Mission Range and Cabinet Mountains is near the highest of record.

The Blackfoot, upper Clark Fork and Bitterroot Rivers are forecast to combine for about 13 percent above average runoff. Streams flowing into the Clark Fork are expected to flow about 110 to 115 percent of average. The Flathead River is forecast to flow about 134 percent of average which is the largest volume in the last 30 years and will combine with the Clark Fork for about 23 percent above average runoff out of Montana.

The late summer flows on the upper Clark Fork are expected to be above average. The Bitterroot River is expected to flow near to a little above average during the late summer irrigation season.

A combination of warm temperatures and heavy rain on the low elevation snow pack could cause some streams to leave their banks.

STREAMFLOW (APRIL THROUGH SEPTEMBER)

STREAM GAGING STA.	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1948-62 Average	1963	1964	1965	1966
STATION NO. 3405 CLARKS FORK RIVER ABOVE MISSOULA	2470	1590	2030	2369	1782	1887	1737	1590	2012	1577	1699	2044	1452	1250	1812	1838	1427	2130	2517	
STATION NO. 3895 THOMPSON RIVER NEAR THOMPSON FALLS									428	276	177	366	268	290	250	302	175	232	312	

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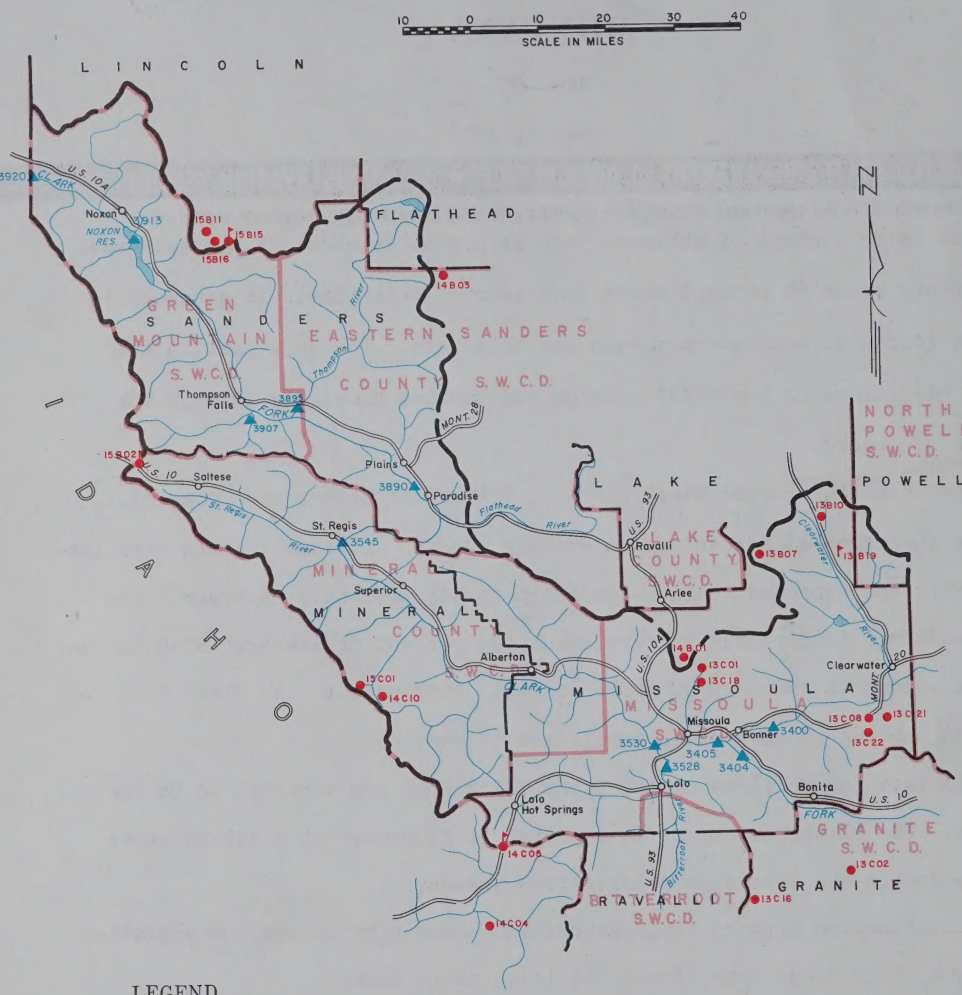
LOWER CLARK FORK RIVER BASIN



LEGEND

- Snow Survey Course
- Soil Moisture Station
- Snow Course and Soil Moisture Station
- Aerial Marker at Snow Course
- Stream Gaging Station
- Drainage
- S.W.C.D. Boundary
- Watershed Boundary
- Highway
- Town
- County Boundary
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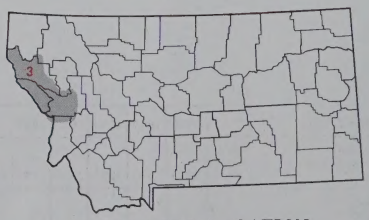


WATERSHED LOCATION

SNOW SURVEY DATA

WATERSHED 3

AS OF MAY 1, 1967

(Inches)

SNOW COURSE			CURRENT DATA			PAST RECORD	
						WATER CONTENT	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE
13C16	Ambrose	6480	4/30	60	20.1	8.0	11.0*
15B11	Baree Creek	5500	5/1	149	62.6	41.0	49.1
15B16	Baree Midway	4600	5/1	116	49.9	24.8	-
15B15	Baree Trail	3800	5/1	12	4.2	0.0	-
14B03	Bassoo Peak	5150	5/1	37	13.8	7.8	9.7*
13B10	Coyote Hill	4200	5/3	19	7.0	0.4	2.3
14C10	Heart Lake Trail	4800	5/1	63	26.4	14.0	-
15C10	Hoodoo Basin Pillow	6000	5/1	SP	57.9	-	-
15C01	Hoodoo Creek	5900	5/1	136	57.6	41.2	50.2*
14C05	Lolo Pass	5230	4/27	82	37.0	20.3	31.8*
15B02	Lookout	5250	5/1	106	42.4	30.0	36.4
13C21	Lubrecht Forest No. 3	5450	4/29	28	7.2	-	3.6*
13C22	Lubrecht Forest No. 4	4650	4/29	3	0.5	-	0.6*
13C08	Lubrecht Forest No. 6	4040	4/29	0	0.0	-	0.1*
13B07	North Fork Jocko	6330	5/3	136	59.0	36.2	48.0*
14C04	Savage Pass	6600	4/27	82	33.2	21.2	-
13C02	Slide Rock Mountain	7100	4/26	53	19.6	12.8	14.7*
13C18	Spring Gulch	6000	4/30	23	5.8	0.0	3.1*
13C01	Stuart Mountain	7400	4/30	95	40.3	28.6	30.4*
14B01	TV Mountain	6800	4/29	61	22.5	17.6	20.3*

SP - Snow pillow observation - water content only.

SOIL MOISTURE DATA

AS OF MAY 1, 1967

(Inches)

SOIL MOISTURE STATION			SOIL PROFILE		CURRENT DATA		PAST RECORD	
NO.	NAME	ELEVATION	DEPTH	FIELD CAPACITY	DATE OF SURVEY	SOIL MOISTURE	LAST YEAR	**AVERAGE
15B15M	Baree Trail	3800	48	7.5	5/1	6.6	7.2	-
14C05M	Lolo Pass	5250	48	10.6	4/27	3.8	7.4	7.4
13B19M	Seeley Lake	4030	48	11.9	5/2	11.8	11.6	11.8

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD). *ADJUSTED AVERAGE **AVERAGE FOR PERIOD OF RECORD

WATER SUPPLY FORECASTS

WATERSHED 3

AS OF MAY 1, 1967

(1000 Acre Feet)

NO.	RIVER AND FORECAST POINT	FORECAST PERIOD	FORECAST THIS YEAR	PERCENT AVERAGE	MEASURED FLOW LAST YEAR*	MEASURED FLOW AVERAGE
3400	BLACKFOOT RIVER Bonner (near)	May-Sept	1,180	129	589	914
3404	CLARK FORK RIVER Milltown (above)(4)	May-Sept	810	118	372	686
3405	CLARK FORK RIVER Missoula (above)	May-Sept	1,990	124	961	1,600
3410	RATTLESNAKE CREEK Missoula (at)	May-Sept	74.0	120	50.5	61.8
3528	BITTERROOT RIVER Missoula (at)(6)	May-Sept	1,395	101	681	1,384
3530	CLARK FORK RIVER Missoula (below)	May-Sept	3,385	113	1,642	2,984
3545	CLARK FORK RIVER St. Regis (at)	May-Sept	4,445	110	2,407	4,036
3890	CLARK FORK RIVER Plains (near)(8)	May-Sept	14,160	126	8,463	11,286
3895	THOMPSON RIVER Thompson Falls (near)	May-Sept	280	112	168	249
3907	PROSPECT CREEK Thompson Falls (at)	May-Sept	145	114	90.2	127
3920	CLARK FORK RIVER Whitehorse Rapids (at)(9)	May-Sept	15,460	123	9,516	12,580

(4) Difference in observed flow, Clark Fork above Missoula & Blackfoot near Bonner.
(6) Difference in observed flow, Clark Fork above and below Missoula.
(8) Adjusted for storage in Flathead Lake and Hungry Horse Reservoir.
(9) Adjusted for storage in Flathead Lake, Hungry Horse and Noxon Reservoirs.

*PROVISIONAL DATA FURNISHED BY U. S. GEOLOGICAL SURVEY

RESERVOIR STORAGE DATA

AS OF APRIL 30, 1967

(1000 Acre Feet)

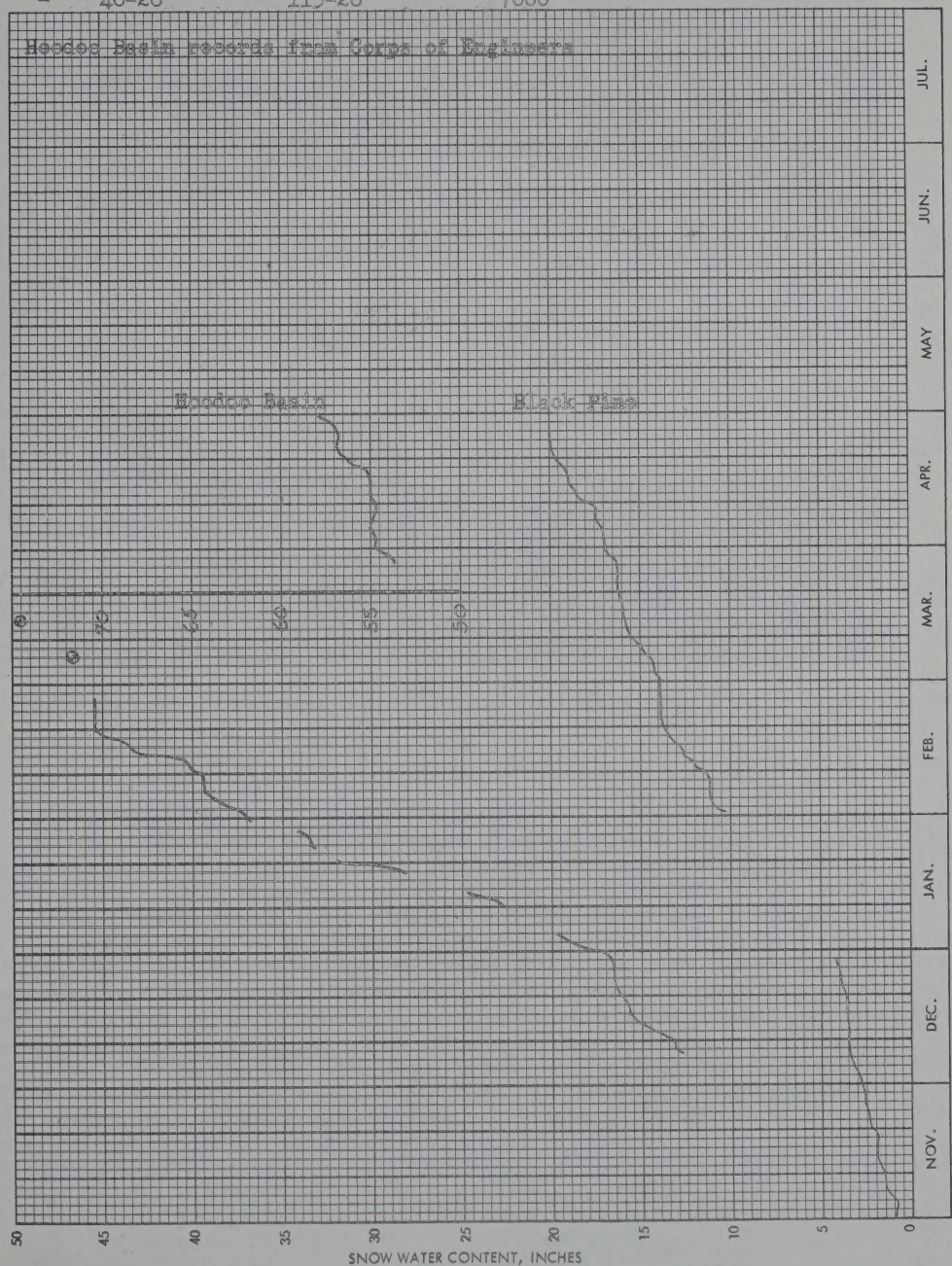
NO.	RESERVOIR	USABLE CAPACITY	THIS YEAR	LAST YEAR	AVERAGE
3913	Noxon Rapids	334.6	39.7	95.0	-

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD).

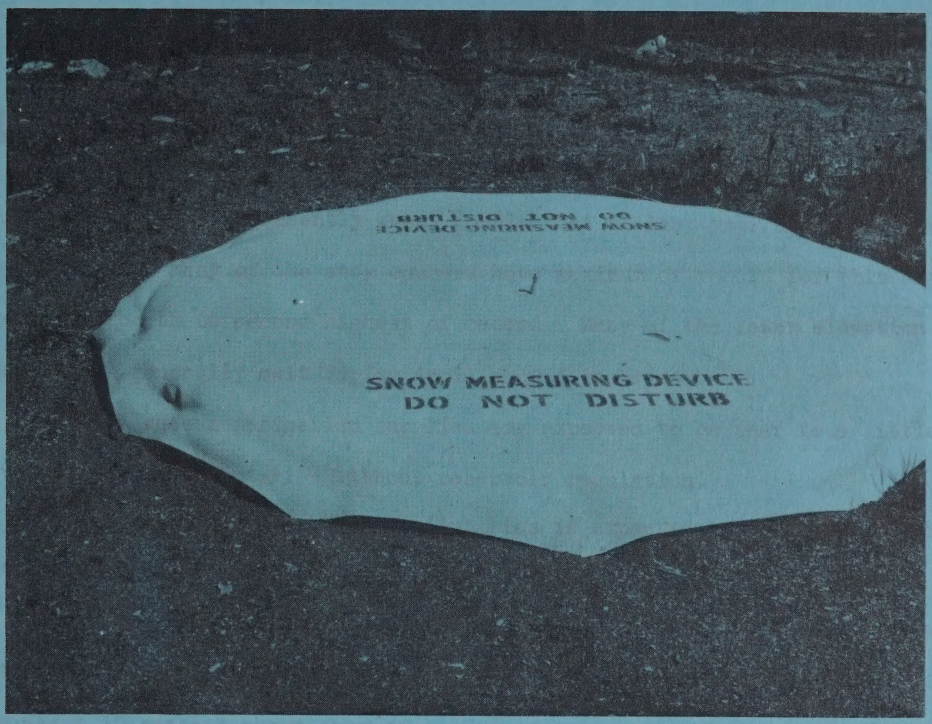
HOODOO BASIN & BLACK PINE
SNOW PILLOW DATA

AS OF MAY 1, 1967

Hoodoo Basin -	Sec. 17	T. 14N	R. 27W	No. 15C08	Drainage: Clark Fork
Black Pine -	26	8N	15W	13C13	
Hoodoo Basin -	Lat. 46-59		Long. 115-02	Elev. 6000	
Black Pine -	46-26		113-26	7000	



THE SNOW PILLOW



Snow Pillow installation at Lick Creek, Montana

During the past few years the Soil Conservation Service has tested snow measuring devices for obtaining a continuous record of snow accumulation and melt. The most versatile and promising is the nylon reinforced butyl or neoprene snow pillow, which is usually about 12 feet in diameter and filled with a methanol alcohol-water solution to a depth of three inches. The pillow is placed on a level ground surface. A hose connects the pillow to a manometer or pressure transducer in an instrument shelter. As snow falls on the pillow the amount of fluid rise in the manometer is equivalent to the water content in the snow pack. A water level recorder installed in the manometer provides a continuous record of the snow water content. Telemetered (transmitted by radio signal) information is obtained by connecting a pressure transducer to the pillow. The signal from the transducer is converted to equivalent inches of water content at the receiving station. Air temperature, total precipitation, soil moisture and soil temperature can be telemetered, in addition to snow water content.

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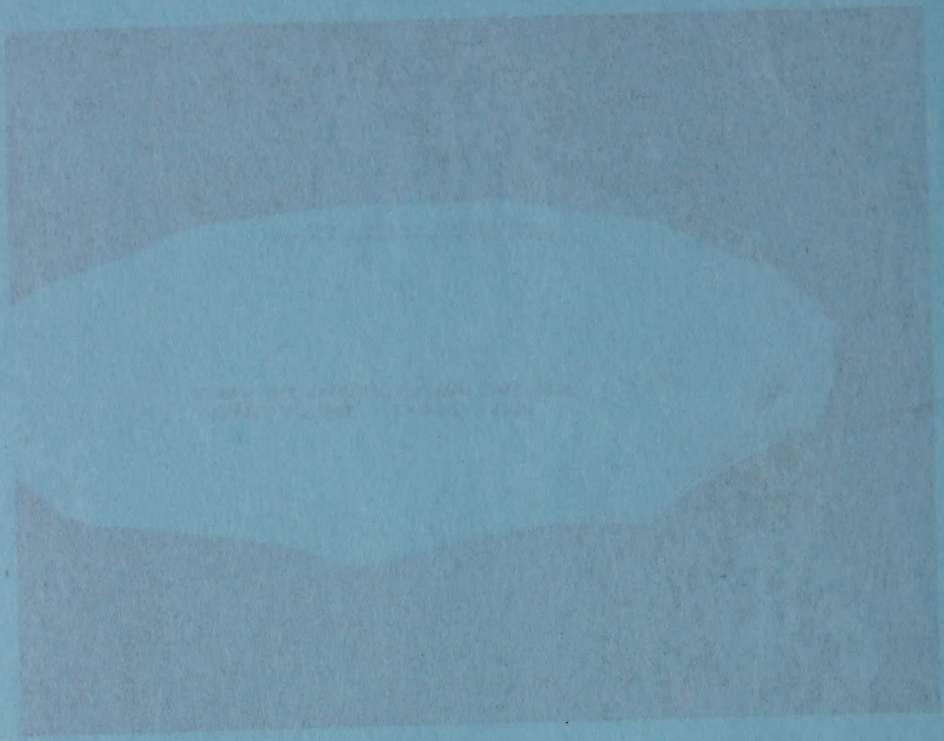


WATER SUPPLY OUTLOOK

UPPER CLARK FORK RIVER BASIN

MONTANA

as of
MAY 1, 1967

UNITED STATES DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

Data included in this report were obtained in cooperation with other Federal, State and private organizations

The snow pack is presently about double that of last year and 50 percent above average. Many of the snow courses have maximum of record for this date. Others are fourth to second highest of record. Many of the lower elevation courses that generally melt during April showed increases.

The late season irrigation supplies are expected to be near to a little above average on tributaries without reservoir regulation.

Streamflow on the Clark Fork tributaries is expected to be 10 to 20 percent above average.

Tributaries to the Blackfoot north of the river are expected to be about 30 to 40 percent above average, while those from the south are expected to flow about 10 percent above average.

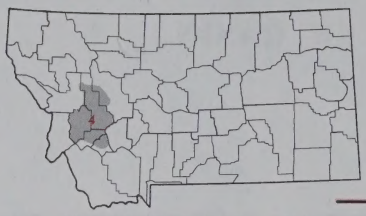
The above average low elevation snow pack presents a good potential for high water. A combination of warm temperatures and prolonged rainfall in the early portion of the melt season could cause some streams to leave their banks.

STREAMFLOW (APRIL THROUGH SEPTEMBER)

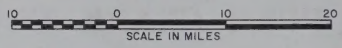
STREAM GAGING STA.	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1948-62 Average	1963	1964	1965	1966
STATION NO. 3404 CLARKS FORK RIVER ABOVE MILLTOWN	1428	778	900	1073	833	806	611	739	880	655	790	706	634	475	722	802	708	1025	1149	
STATION NO. 3400 BLACKFOOT RIVER NEAR BONNER	1312	812	1130	1295	948	1080	1126	851	1132	922	909	1338	818	775	1089	1036	719	1105	1368	

Report prepared by
U. S. DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE
SNOW SURVEY AND WATER SUPPLY FORECASTING UNIT
BOX 98, BOZEMAN, MONTANA 59715

UPPER CLARK FORK RIVER BASIN



WATERSHED LOCATION



N

MISSOULA S.W.C.D.

MISSOULA

LEWIS & CLARK S.W.C.D.

LEWIS & CLARK

NORTH POWELL S.W.C.D.

POWELL

DEER LODGE VALLEY S.W.C.D.

DEER LODGE

GRANITE

GRANITE S.W.C.D.

RAVALLI

DEER LODGE MILE HIGH S.W.C.D.

JEFFERSON

SILVER BOW

Ovando
Lincoln
Bonita
Bearmouth
Drummond
Hall
Gold Creek
Garrison
Avon
Elliston
Maxville
Phillipsburg
Deer Lodge
Warmsprings
Anaconda
Butte

MONT. 20
U.S. 10 & 12
U.S. 104
MONT. 38
U.S. 91
U.S. 10
U.S. 12

Blackfoot River
Nevada Creek
Little Blackfoot
Flint Creek
Rock Creek
Clark Fork

NEVADA CREEK RES.
Lower Willow Creek Reservoir

12B11 12B10
12C08
12C01
13C08
13C22 13C21
3400
3404
3355
13C02
13C16
3301
3300
3295
13C13
13C10
13C09
12C02
12C03
12C04
12C05
13C11
13C12
3241
13C03
13C04 13C05
3250
13C06
3320
13C07
12C09
12D01

LEGEND

- Snow Survey Course
- Soil Moisture Station
- Snow Course and Soil Moisture Station
- Aerial Marker at Snow Course
- Snow Pillow
- Precipitation Gage
- Stream Gaging Station
- Drainage
- S.W.C.D. Boundary
- Watershed Boundary
- Highway
- Town
- County Boundary
- State Boundary

SNOW SURVEY DATA

WATERSHED 4

AS OF MAY 1, 1967

(Inches)

SNOW COURSE			CURRENT DATA			PAST RECORD	
						WATER CONTENT	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE
13C16	Ambrose	6480	4/30	60	20.1	8.0	11.0*
13C13	Black Pine	7100	4/27	53	19.7	10.8	11.8*
13C13	Black Pine Pillow	7100	4/27	SP	20.1	11.8	-
12C05	Chessman Reservoir	6200	4/26	24	7.8	0.6	2.9
12B10	Copper Creek	5700	4/25	46	19.6	4.8	-
12B11	Cotter Mine	6250	4/25	65	28.0	11.8	-
13C11	Fred Burr Pass	8000	4/29	99	35.8	20.9	32.5*
13C04	Intergaard	6450	5/2	50	14.9	2.0	-
13C21	Lubrecht Forest No. 3	5450	4/29	28	7.2	-	3.6*
13C22	Lubrecht Forest No. 4	4650	4/29	3	0.5	-	0.6*
13C08	Lubrecht Forest No. 6	4040	4/29	0	0.0	-	0.1*
12D01	Pipestone Pass	7200	5/3	54	13.8	1.9	4.4*
13C12	Red Lion	7100	4/29	67	21.5	11.6	19.6*
13C03	Skalkaho Summit	7260	4/27	80	32.2	19.5	26.7*
13C02	Slide Rock Mountain	7100	4/26	53	19.6	12.8	14.7*
12C01	Stemple Pass	6600	4/27	47	16.0	7.5	9.8
13C07	Storm Lake	7780	4/29	68	21.6	11.2	17.0*
12C02	Ten Mile Lower	6600	4/26	33	11.2	1.8	4.1
12C03	Ten Mile Middle	6800	4/25	48	16.4	7.7	9.9
12C04	Ten Mile Upper	8000	4/25	53	19.9	10.1	14.2

SP - Snow pillow observation - water content only.

SOIL MOISTURE DATA

AS OF MAY 1, 1967

(Inches)

SOIL MOISTURE STATION			SOIL PROFILE		CURRENT DATA		PAST RECORD	
NO.	NAME	ELEVATION	DEPTH	FIELD CAPACITY	DATE OF SURVEY	SOIL MOISTURE	LAST YEAR	**AVERAGE
13C13M	Black Pine	7100	48	10.0	4/27	6.6	5.5	-
13C15M	Georgetown Lake	6450	48	9.0	4/29	5.9	7.2	5.8
13C03M	Skalkaho Summit	7260	48	10.8	4/27	9.9	10.4	-
12C08M	Stemple Pass	6350	48	5.9	5/1	4.2	5.4	5.5

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD). *ADJUSTED AVERAGE **AVERAGE FOR PERIOD OF RECORD

WATER SUPPLY FORECASTS

WATERSHED 4

AS OF MAY 1, 1967

(1000 Acre Feet)

NO.	RIVER AND FORECAST POINT	FORECAST PERIOD	FORECAST THIS YEAR	PERCENT AVERAGE	MEASURED FLOW LAST YEAR*	MEASURED FLOW AVERAGE
	RACETRACK CREEK					
3241	Anaconda (near)	May-Sept	39.5	109	23.0	36.2
	FLINT CREEK					
3301	Boulder Creek (below)(3)	May-Sept	70.5	110	39.2	64.1
	MIDDLE FORK ROCK CREEK					
3320	Philipsburg	May-Sept	88.0	120	39.6	73.6
	BLACKFOOT RIVER					
3400	Bonner (near)	May-Sept	1180	129	589	914
	CLARK FORK RIVER					
3404	Milltown (above)(4)	May-Sept	810	118	372	686

(3) Sum, Flint Creek at Maxville and Boulder Creek at Maxville.
(4) Difference in observed flow, Clark Fork above Missoula and Blackfoot near Bonner.

*PROVISIONAL DATA FURNISHED BY U. S. GEOLOGICAL SURVEY

RESERVOIR STORAGE DATA

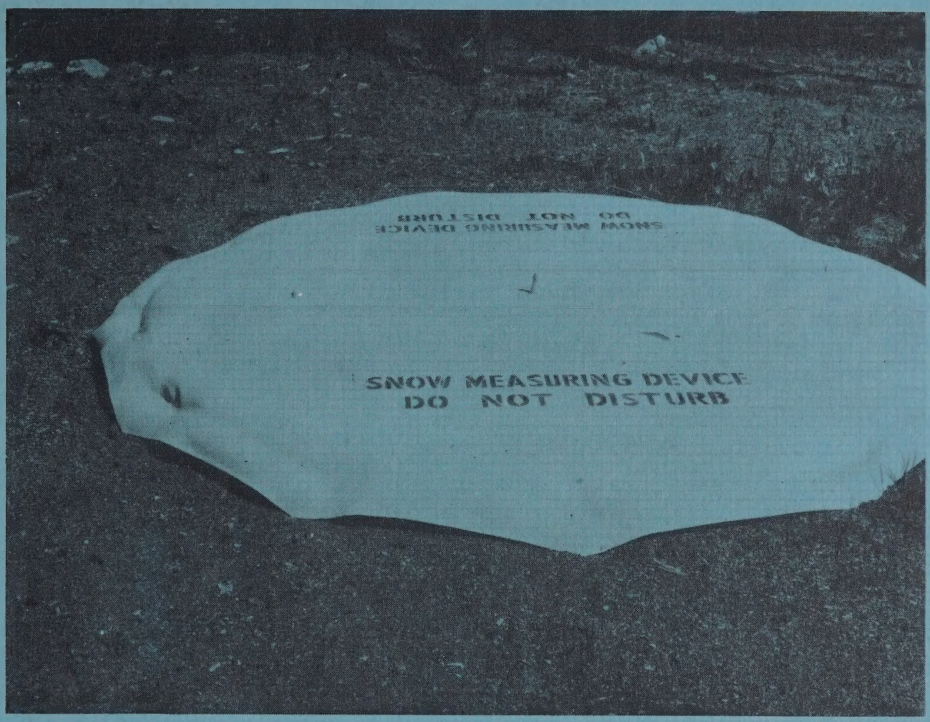
AS OF APRIL 30, 1967

(1000 Acre Feet)

NO.	RESERVOIR	USABLE CAPACITY	THIS YEAR	LAST YEAR	AVERAGE
3250	Georgetown Lake	31.0	18.9	21.6	21.2

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD).

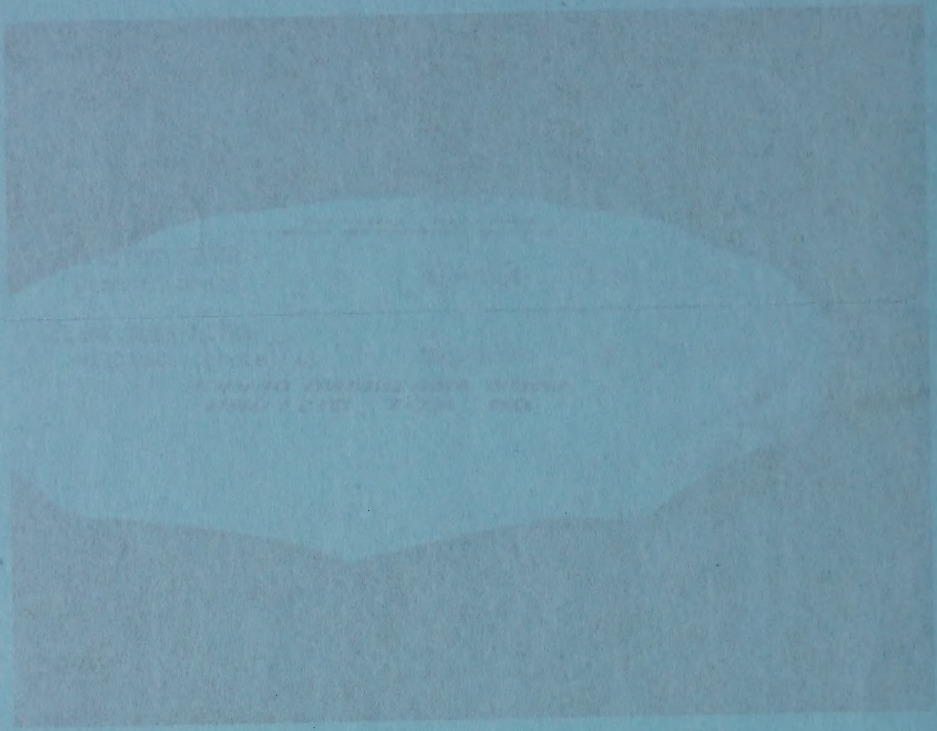
THE SNOW PILLOW



Snow Pillow installation at Lick Creek, Montana

During the past few years the Soil Conservation Service has tested snow measuring devices for obtaining a continuous record of snow accumulation and melt. The most versatile and promising is the nylon reinforced butyl or neoprene snow pillow, which is usually about 12 feet in diameter and filled with a methanol alcohol-water solution to a depth of three inches. The pillow is placed on a level ground surface. A hose connects the pillow to a manometer or pressure transducer in an instrument shelter. As snow falls on the pillow the amount of fluid rise in the manometer is equivalent to the water content in the snow pack. A water level recorder installed in the manometer provides a continuous record of the snow water content. Telemetered (transmitted by radio signal) information is obtained by connecting a pressure transducer to the pillow. The signal from the transducer is converted to equivalent inches of water content at the receiving station. Air temperature, total precipitation, soil moisture and soil temperature can be telemetered, in addition to snow water content.

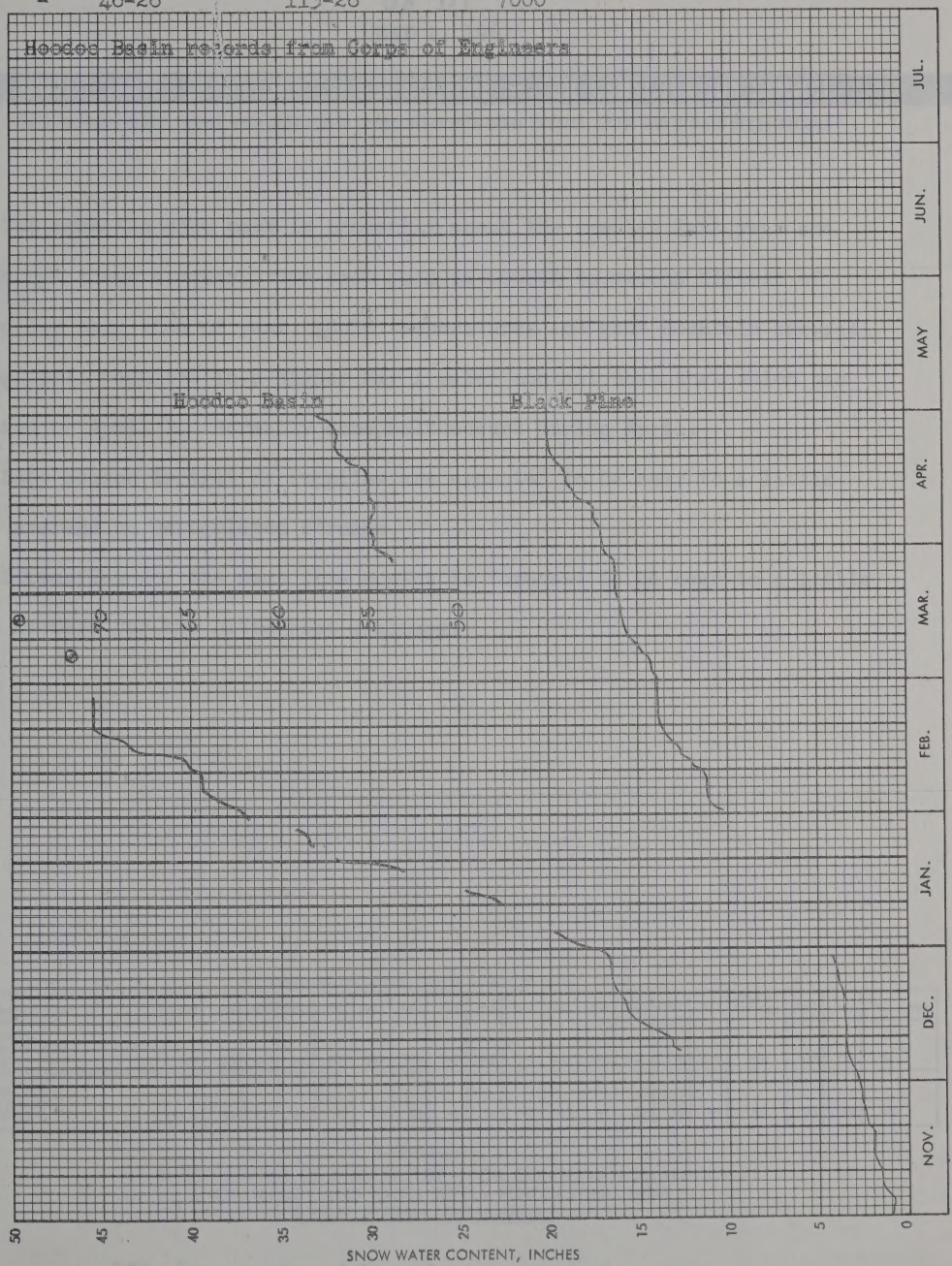
USDA-SCS-PORTLAND, OREG. 1967



HOODOO BASIN & BLACK PINE
SNOW PILLOW DATA

AS OF MAY 1, 1967

Hoodoo Basin -	Sec. 17	T. 14N	R. 27W	No. 15C08	Drainage: Clark Fork
Black Pine -	26	8N	15W	13C13	
Hoodoo Basin -	Lat. 46-59	Long. 115-02	Elev. 6000		
Black Pine -	46-26	113-26	7000		



WATER SUPPLY OUTLOOK

BITTERROOT RIVER BASIN

MONTANA

as of

MAY 1, 1967

UNITED STATES DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

Data included in this report were obtained in cooperation with other Federal, State and private organizations

The mountain snow pack is presently about the same as last year and 25 percent above average. The snow pack is fourth to second highest of record for this time of year. Cold temperatures and good mountain snowfall during April resulted in a higher May 1 water content than that which was measured on April 1. Normally some melt occurs during April.

Late season irrigation supplies are expected to be near to a little above average on unregulated streams.

Streamflow for the next five months is forecast to be near to a little above average for the Bitterroot drainage.

STREAMFLOW (APRIL THROUGH SEPTEMBER)

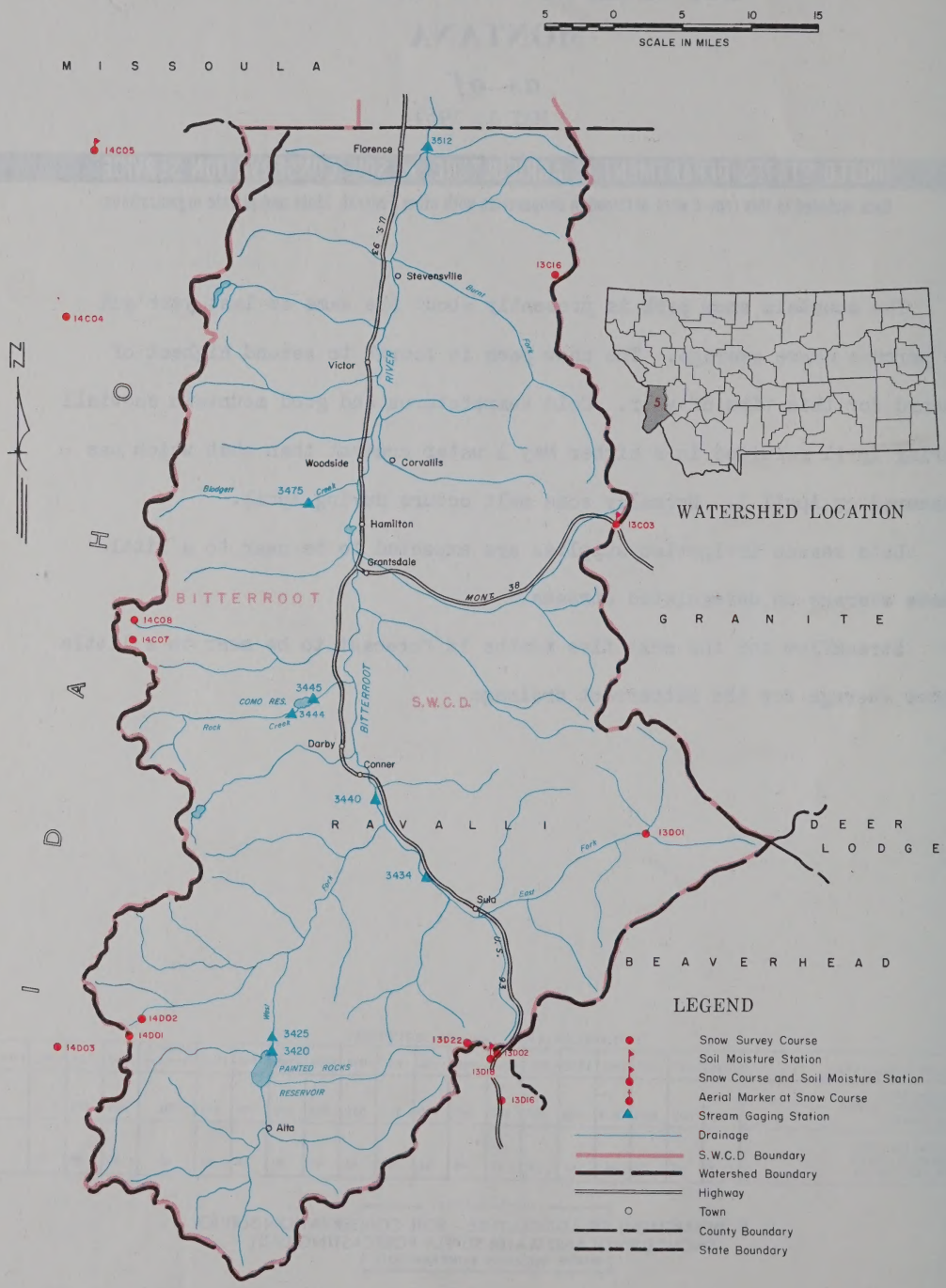
STREAM GAGING STA.	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1948-62 Average	1963	1964	1965	1966
STATION 3440 BITTERROOT RIVER NEAR DARBY	765	605	630	663	608	557	523	540	740	515	531	593	521	398	545	582	534	783	740	
STATION NO. 3475 BLODGETT CREEK NEAR CORVALLIS	51.3	45	51	46	42	40	52	45	51	42	42	47	36	39	41	45	35	48	55	

Report prepared by

U. S. DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE
SNOW SURVEY AND WATER SUPPLY FORECASTING UNIT
BOX 98, BOZEMAN, MONTANA 59715

"The Conservation of Water begins with the Snow Survey"

BITTERROOT RIVER BASIN



SNOW SURVEY DATA

WATERSHED 5

AS OF MAY 1, 1967

(Inches)

SNOW COURSE			CURRENT DATA			PAST RECORD	
						WATER CONTENT	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE
13C16	Ambrose	6480	4/30	60	20.1	8.0	11.0*
13D02	Gibbons Pass	7100	4/27	71	27.2	12.8	23.1
14C05	Lolo Pass	5230	4/27	82	37.0	20.3	31.8*
14C07	Lost Horse	5940	4/28	90	36.8	19.0	34.1*
14D02	Nez Perce Camp	5680	4/26	44	18.0	4.2	9.7
14D01	Nez Perce Pass	6570	4/26	51	20.9	6.0	13.3
13D22	Saddle Mountain	7940	4/27	85	31.6	18.4	-
14C04	Savage Pass	6600	4/27	82	33.2	21.2	-
13C03	Skalkaho Summit	7260	4/27	80	32.2	19.5	26.7*
14C08	Twin Lakes	6510	4/28	117	49.4	29.4	46.6*

SOIL MOISTURE DATA

AS OF MAY 1, 1967

(Inches)

SOIL MOISTURE STATION			SOIL PROFILE		CURRENT DATA		PAST RECORD	
NO.	NAME	ELEVATION	DEPTH	FIELD CAPACITY	DATE OF SURVEY	SOIL MOISTURE	LAST YEAR	**AVERAGE
13D18M	Gibbons Pass	7100	48	7.1	4/26	4.9	6.2	6.3
14C05M	Lolo Pass	5250	48	10.6	4/27	3.8	7.4	7.4
13C03M	Skalkaho Summit	7260	48	10.8	4/27	9.9	10.4	-

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD). *ADJUSTED AVERAGE **AVERAGE FOR PERIOD OF RECORD

WATER SUPPLY FORECASTS

WATERSHED 5

AS OF MAY 1, 1967

(1000 Acre Feet)

NO.	RIVER AND FORECAST POINT	FORECAST PERIOD	FORECAST THIS YEAR	PERCENT AVERAGE	MEASURED FLOW LAST YEAR*	MEASURED FLOW AVERAGE
	WEST FORK BITTERROOT RIVER					
3425	Conner (near)(5)	May-Sept	168	107	62	157
	EAST FORK BITTERROOT RIVER					
3434	Conner (near)	May-Sept	167	108	71.1	155
	BITTERROOT RIVER					
3440	Darby (near)	May-Sept	550	106	23.2	518
	SKALKAHO CREEK					
3465	Hamilton (near)	May-Sept	62.5	109	32.0	57.4
	BLODGETT CREEK					
3475	Corvallis (near)	May-Sept	42.0	105	25.7	39.9
	BITTERROOT RIVER					
3528	Missoula (at)(6)	May-Sept	1395	101	681	1384

(5) Adjusted for storage in Painted Rocks Reservoir.
(6) Difference in observed flow, Clark Fork above and below Missoula.

*PROVISIONAL DATA FURNISHED BY U. S. GEOLOGICAL SURVEY

RESERVOIR STORAGE DATA

AS OF APRIL 30, 1967

(1000 Acre Feet)

NO.	RESERVOIR	USABLE CAPACITY	THIS YEAR	LAST YEAR	AVERAGE
3420	Painted Rocks	31.7	16.5	20.5	22.0
3445	Como	34.9	10.7	20.7	17.9

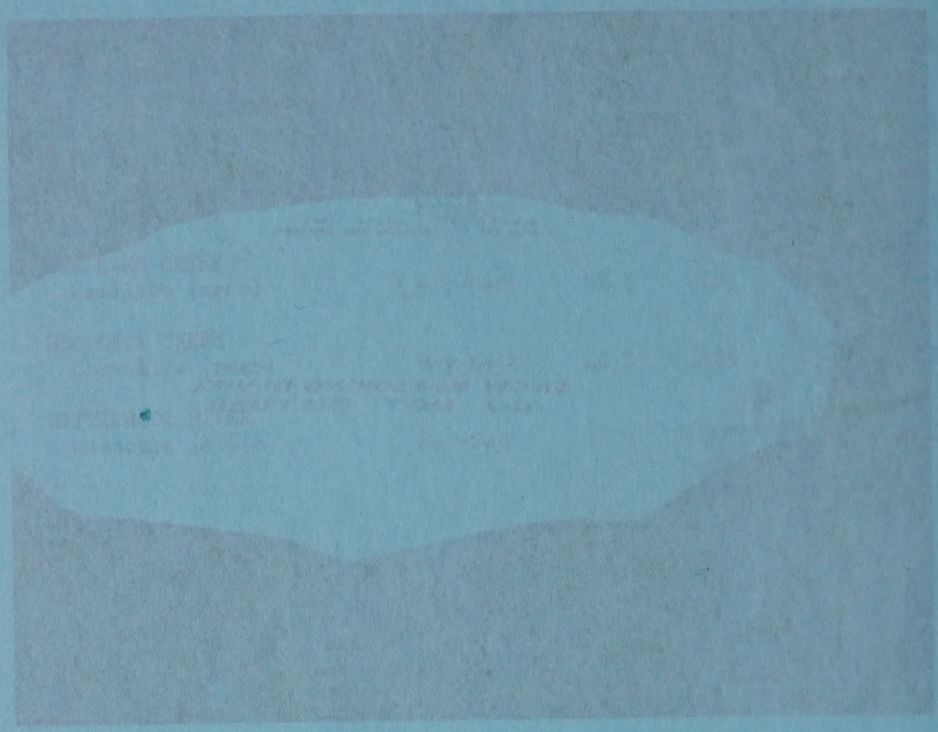
NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD).

THE SNOW PILLOW

Snow Pillow installation at Lick Creek, Montana

During the past few years the Soil Conservation Service has tested snow measuring devices for obtaining a continuous record of snow accumulation and melt. The most versatile and promising is the nylon reinforced butyl or neoprene snow pillow, which is usually about 12 feet in diameter and filled with a methanol alcohol-water solution to a depth of three inches. The pillow is placed on a level ground surface. A hose connects the pillow to a manometer or pressure transducer in an instrument shelter. As snow falls on the pillow the amount of fluid rise in the manometer is equivalent to the water content in the snow pack. A water level recorder installed in the manometer provides a continuous record of the snow water content. Telemetered (transmitted by radio signal) information is obtained by connecting a pressure transducer to the pillow. The signal from the transducer is converted to equivalent inches of water content at the receiving station. Air temperature, total precipitation, soil moisture and soil temperature can be telemetered, in addition to snow water content.

USDA-SCS-PORTLAND, OREG. 1967



WATER SUPPLY OUTLOOK
MARIAS, TETON and SUN RIVER BASINS
MONTANA

as of
MAY 1, 1967

UNITED STATES DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE
Data included in this report were obtained in cooperation with other Federal, State and private organizations

The water stored in the mountain snow pack is about 60 percent more than a year ago and 55 percent above the 1948-62 average. Late season irrigation supplies are expected to be above average on tributaries without reservoir regulation.

Streamflow for the next five months is forecast to be a little below the volumes produced in 1964 and higher than those of 1965.

The low elevation snow cover is well above average for this late in the season and could cause streams to leave their banks if warm temperatures and heavy rainfall occur during the early portion of the melt period. Those persons living in areas where previous flooding has occurred might be prepared should these conditions develop.

STREAMFLOW (APRIL THROUGH SEPTEMBER)

STREAM GAGING STA.	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1948-62 Average	1963	1964	1965	1966
STATION NO. 9786 SUN RIVER AT GIBSON DAM	741	411	712	752	499	738	748	517	669	531	555	749	436	474	616	610	387	737	702	
STATION NO. 0995 MARIAS RIVER NEAR SHELBY	1132	340	950	1013	457	928	782	600	683	510	483	698	405	380	398	651	280	937	751	

Report prepared by
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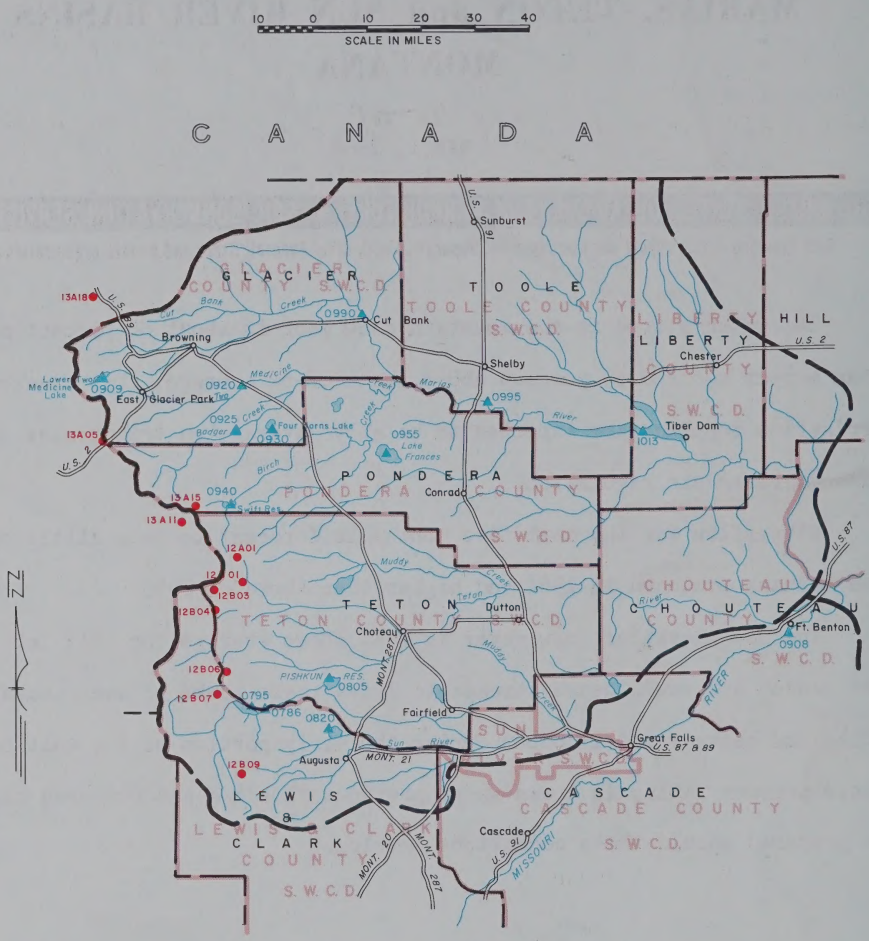
SNOW SURVEY AND WATER SUPPLY FORECASTING UNIT
BOX 98, BOZEMAN, MONTANA 59715

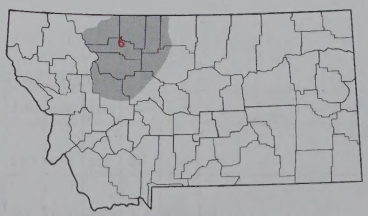
"The Conservation of Water begins with the Snow Survey"

MARIAS, TETON and SUN RIVER BASINS



LEGEND

- Snow Survey Course
- Soil Moisture Station
- Snow Course and Soil Moisture Station
- Aerial Marker at Snow Course
- Stream Gaging Station
- Drainage
- S.W.C.D. Boundary
- Watershed Boundary
- Highway
- Town
- County Boundary
- State Boundary



WATERSHED LOCATION

SNOW SURVEY DATA

WATERSHED 6

AS OF MAY 1, 1967

(Inches)

SNOW COURSE			CURRENT DATA			PAST RECORD	
						WATER CONTENT	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE
13A15	Badger Pass	6900	5/4	120	50.4	37.1	-
13A11	Beaver Lake	5900	5/4	86	36.4	20.2	-
12B06	Cabin Creek	5200	5/4	30	13.6	0.0	-
12B09	Five-Bull	5700	5/4	39	13.8	0.5	-
12A01	Freight Creek	6000	5/4	64	26.2	11.8	-
12B07	Goat Mountain	7000	4/30	54	17.0	9.2	10.3*
13A18	Hudson Bay Divide	5800	5/1	84	29.4	17.5	-
13A03	Iceberg Lake No. 3	5600	5/3	114	51.0	28.3	29.6
13A14	Josephine Lower No. 9	4900	5/2	80	32.8	18.9	17.9*
13A05	Marias Pass	5250	4/26	63	25.9	14.0	18.0
13A16	Mineral Creek	4000	5/1	53	23.2	9.4	-
13A07	Mount Allen No. 7	5700	5/2	150	72.9	47.8	49.2
13A06	Piegan Pass No. 6	5500	5/2	135	59.4	42.6	41.3
13A08	Ptarmigan No. 8	5800	5/3	133	59.8	36.1	40.3
12B04	Wrong Creek	5700	5/4	47	20.9	9.1	-
12B03	Wrong Ridge	6800	5/4	70	30.1	18.3	-

SOIL MOISTURE DATA

AS OF MAY 1, 1967

(Inches)

SOIL MOISTURE STATION			SOIL PROFILE		CURRENT DATA		PAST RECORD	
NO.	NAME	ELEVATION	DEPTH	FIELD CAPACITY	DATE OF SURVEY	SOIL MOISTURE	LAST YEAR	**AVERAGE
13A05M	Marias Pass	5250	54	6.5	5/1	5.8	-	6.0

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD). *ADJUSTED AVERAGE **AVERAGE FOR PERIOD OF RECORD

WATER SUPPLY FORECASTS

WATERSHED 6

AS OF MAY 1, 1967

(1000 Acre Feet)

NO.	RIVER AND FORECAST POINT	FORECAST PERIOD	FORECAST THIS YEAR	PERCENT AVERAGE	MEASURED FLOW LAST YEAR*	MEASURED FLOW AVERAGE
	SUN RIVER					
0786	Gibson Dam (at)(18)	May-Sept	690	120	406	573
	MISSOURI RIVER					
0908	Fort Benton (at)(17)	May-Sept	3850	135	1663	2861
	TWO MEDICINE CREEK					
0920	Browning (near)(19)	May-Sept	290	120	170	241
	BADGER CREEK					
0925	Browning (near)	May-Sept	155	117	94	132
	CUT BANK CREEK					
0990	Cut Bank (at)	May-Sept	140	123	77.2	114
	MARIAS PASS					
0995	Shelby (near)(20)	May-Sept	690	122	358	564

(17) Adjusted for storage in Canyon Ferry Reservoir.
(18) Adjusted for storage in Gibson Reservoir and diversions.
(19) Adjusted for storage in Two Medicine Reservoir and diversions into Two Medicine Canal.
(20) Adjusted for storage in Two Medicine, Four Horns, Lake Frances and Swift Reservoirs.

*PROVISIONAL DATA FURNISHED BY U. S. GEOLOGICAL SURVEY

RESERVOIR STORAGE DATA

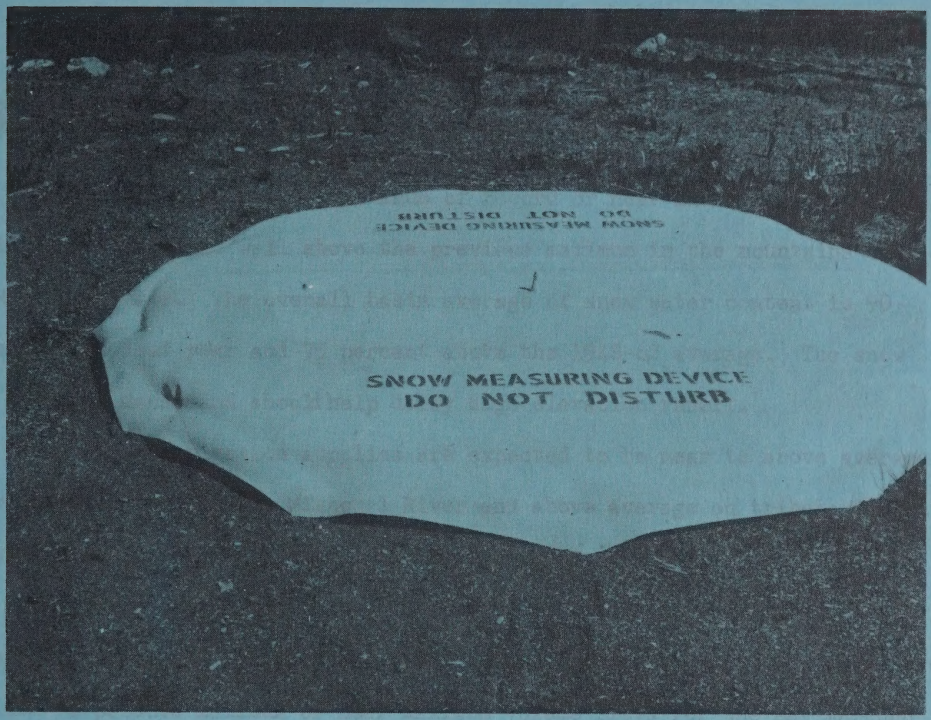
AS OF APRIL 30, 1967

(1000 Acre Feet)

NO.	RESERVOIR	USABLE CAPACITY	THIS YEAR	LAST YEAR	AVERAGE
0795	Gibson	105.0	29.0	74.5	65.7
0805	Pishkun	32.0	15.7	24.7	22.5
0820	Willow Creek	32.3	17.2	26.6	23.4
0930	Four Horns	20.0		12.2	10.9
0940	Swift	30.0		-	26.7
0955	Lake Frances	112.0	75.8	98.9	96.0
1013	Tiber	1,347.0	437.2	708.6	656.3

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD).

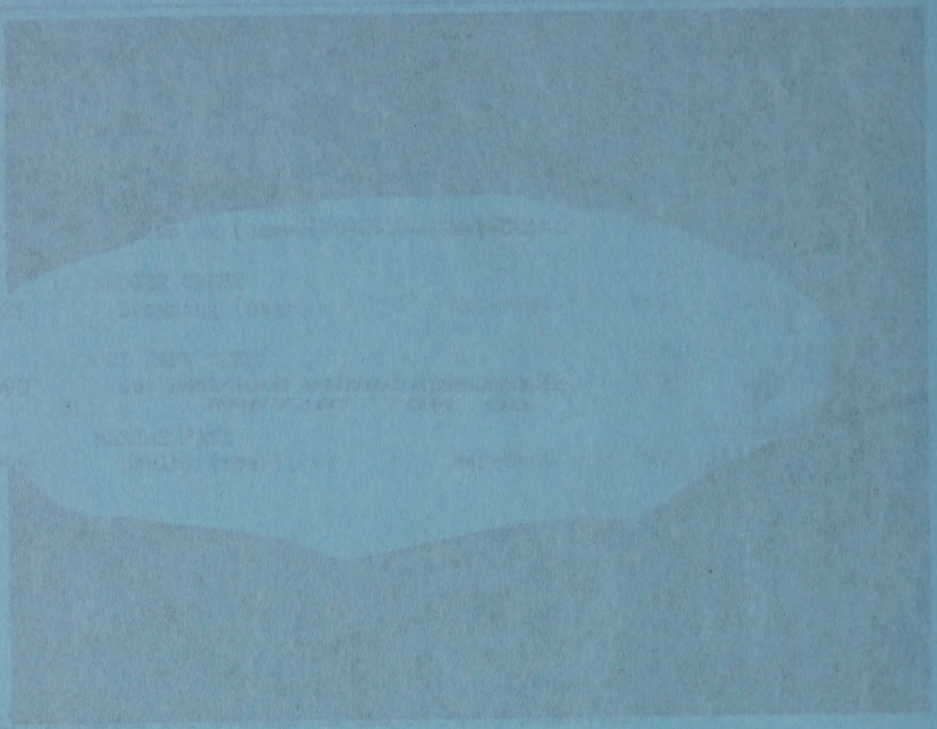
THE SNOW PILLOW



Snow Pillow installation at Lick Creek, Montana

During the past few years the Soil Conservation Service has tested snow measuring devices for obtaining a continuous record of snow accumulation and melt. The most versatile and promising is the nylon reinforced butyl or neoprene snow pillow, which is usually about 12 feet in diameter and filled with a methanol alcohol-water solution to a depth of three inches. The pillow is placed on a level ground surface. A hose connects the pillow to a manometer or pressure transducer in an instrument shelter. As snow falls on the pillow the amount of fluid rise in the manometer is equivalent to the water content in the snow pack. A water level recorder installed in the manometer provides a continuous record of the snow water content. Telemetered (transmitted by radio signal) information is obtained by connecting a pressure transducer to the pillow. The signal from the transducer is converted to equivalent inches of water content at the receiving station. Air temperature, total precipitation, soil moisture and soil temperature can be telemetered, in addition to snow water content.

USDA-SCS-PORTLAND, OREG. 1967



WATER SUPPLY OUTLOOK

MISSOURI RIVER (MAIN STEM) BASIN

MONTANA

as of

MAY 1, 1967

UNITED STATES DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

Data included in this report were obtained in cooperation with other Federal, State and private organizations

The mountain snow pack is maximum of record or near maximum along the Continental Divide and well above the previous maximum in the mountains east of the Missouri River. The overall basin average of snow water content is 90 percent above last year and 75 percent above the 1948-62 average. The snow pack is quite dense and should help delay high elevation runoff.

Late season irrigation supplies are expected to be near to above average on tributaries west of the Missouri River and above average on tributaries with headwaters in the Big Belt and Little Belt Mountains.

Streamflow for the May through September period is forecast to be about 30 percent above average for the west side streams. Streams on the east side are expected to produce maximum or near maximum volume flows for the May through September period or slightly higher than the large volumes produced in 1965.

The low elevation snow pack is very high for this late in the season and could cause quite high flows if warm temperatures and heavy rainfall occur during the early portion of the melt period.

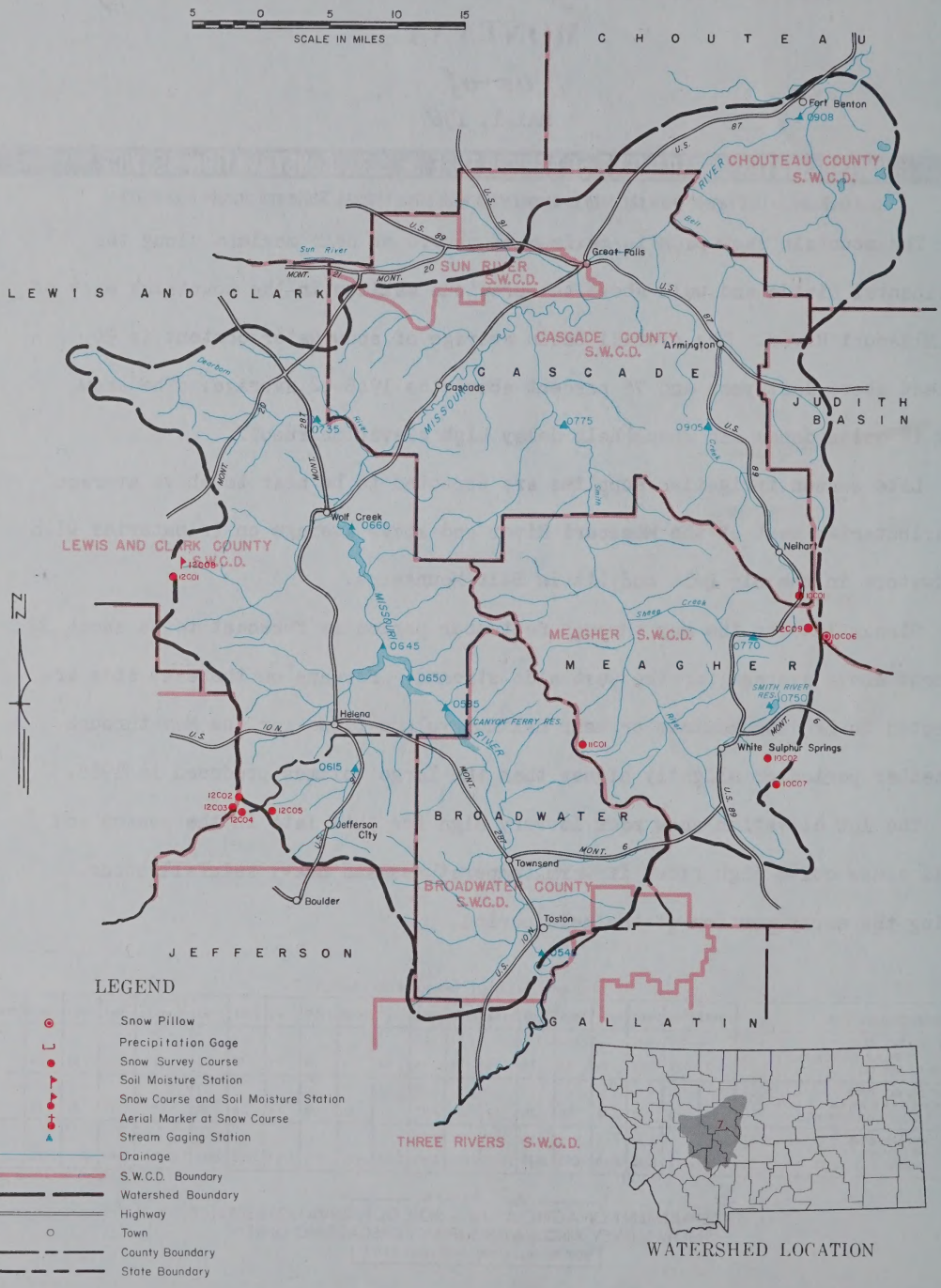
STREAMFLOW (APRIL THROUGH SEPTEMBER)

STREAM GAGING STA.	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1948-62 Average	1963	1964	1965	1966
STATION NO. 0615 PRICKLY PEAR CREEK NEAR CLANCY	42	22	27	26	22	27	16	22	16	15	24	18	19	10	23	22	19	36	26	
STATION NO. 0770 SHEEP CREEK NEAR WHITE SULPHUR SPRINGS	24	16	17	18	18	25	13	18	12	15	11	20	14	10	17	17	17	27	32	
STATION NO. 0545 MISSOURI RIVER AT TOSTON	3475	2512	2220	2319	2895	2139	1561	1730	2345	2187	1971	1991	1774	1102	2347	2147	2199	2710	3432	

Report prepared by
U. S. DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE
SNOW SURVEY AND WATER SUPPLY FORECASTING UNIT
BOX 98, BOZEMAN, MONTANA 59715

"The Conservation of Water begins with the Snow Survey"

MISSOURI RIVER (MAIN STEM) BASIN



SNOW SURVEY DATA

WATERSHED 7

AS OF MAY 1, 1967

(Inches)

SNOW COURSE			CURRENT DATA			PAST RECORD	
						WATER CONTENT	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE
11001	Boulder Mountain	7950	5/1	84	29.5	18.0	16.1*
12005	Chessman Reservoir	6200	4/26	24	7.8	0.6	2.9
10009	Deadman Creek	6450	5/3	48	18.8	5.6	-
10007	Elk Peak	8000	5/2	83	28.7	17.2	16.5*
10002	Grasshopper	7000	5/2	[illegible]	11.1	4.2	-
10001	Kings Hill	[illegible]			22.9	12.4	13.8
10006	Spur Park				[illegible]	20.4	20.0*
10006	Spur Park Pillow	[illegible]				-	-
12001	Stemple Pass	6600	4/27	47	16.[illegible]	[illegible].5	9.8
12002	Ten Mile Lower	6600	4/26	33	11.2	[illegible].8	4.1
12003	Ten Mile Middle	6800	4/25	48	16.4	7.7	9.9
12004	Ten Mile Upper	8000	4/25	53	19.9	10.1	14.2

SP - Snow pillow observation - water content only.

SOIL MOISTURE DATA

AS OF MAY 1, 1967

(Inches)

SOIL MOISTURE STATION			SOIL PROFILE		CURRENT DATA		PAST RECORD	
NO.	NAME	ELEVATION	DEPTH	FIELD CAPACITY	DATE OF SURVEY	SOIL MOISTURE	LAST YEAR	**AVERAGE
10001M	Kings Hill	7420	48	11.8	5/3	4.7	8.8	8.3
12008M	Stemple Pass	6350	48	5.9	5/1	4.2	5.4	5.5

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD). *ADJUSTED AVERAGE **AVERAGE FOR PERIOD OF RECORD

WATER SUPPLY FORECASTS

WATERSHED 7

AS OF MAY 1, 1967

(1000 Acre Feet)

NO.	RIVER AND FORECAST POINT	FORECAST PERIOD	FORECAST THIS YEAR	PERCENT AVERAGE	MEASURED FLOW LAST YEAR*	MEASURED FLOW AVERAGE
	MISSOURI RIVER					
0545	Toston (at)(16)	May-Sept	2450	135	812	1816
	PRICKLY PEAR CREEK					
0615	Clancy (near)	May-Sept	24.5	129	12.2	19.0
	SHEEP CREEK					
0770	W. Sulphur Springs (nr)	May-Sept	32.0	208	17.3	15.4
	SUN RIVER					
0786	Gibson Dam (at)(17)	May-Sept	690	120	406	573
	MISSOURI RIVER					
0908	Fort Benton (at)(18)	May-Sept	3850	135	1663	2861

(16) Adjusted for storage in Hebgen and Ennis Lakes and Clark Canyon Reservoir.
(17) Adjusted for storage in Gibson Reservoir and diversions.
(18) Adjusted for storage in Canyon Ferry Reservoir.

*PROVISIONAL DATA FURNISHED BY U. S. GEOLOGICAL SURVEY

RESERVOIR STORAGE DATA

AS OF APRIL 30, 1967

(1000 Acre Feet)

NO.	RESERVOIR	USABLE CAPACITY	THIS YEAR	LAST YEAR	AVERAGE
0585	Canyon Ferry	2,043.0	1,026.0	1,478.0	1,577.4
0645	Lake Helena	10.4	10.2	10.7	6.6
0650	Hauser Lk. & Lk. Helena	61.9	61.3	62.4	49.9
0660	Holter Lake	81.9	53.4	78.1	61.8
0750	Smith River	10.7	7.5	10.8	8.1

NOTE: [illegible] BASED ON [illegible] (AS YEAR PERIOD).

WATER SUPPLY FORECASTS

AS OF MAY 15, 1957

(1,000 Acre Feet)

No.	Forecast Point	Forecast Period	Forecast Runoff	Percent Average	Streamflow Rank Since 1944*	Streamflow Rank Average
	ARKANSAS RIVER					
0542	Leadville (at)(24)	May-Sept.	2450	139	8/2	18/6
	BIG THOMPSON CREEK					
0613	Glendevey (near)	May-Sept.	24.5	129	12/2	19/6
	SOUTH PLATTE RIVER					
0770	Nr. Kassler Springs (at)	May-Sept.	72.0	208	17/3	15/4
	BOULDER RIVER					
0798	Gibson Dam (at)(27)	May-Sept.	690	130	108	5/3
	MISSOURI RIVER					
0908	Fort Benton (at)(18)	May-Sept.	3910	139	1603	4/2

(18) Adjusted for storage in Hungry Horse and Ennis Lakes and Clark Canyon Reservoir.
(27) Adjusted for storage in Gibson Reservoir and diversions.
(24) Adjusted for storage in Grayson Ferry Reservoir.

*Rank 1 = most data available in 1 - 1957/58 years

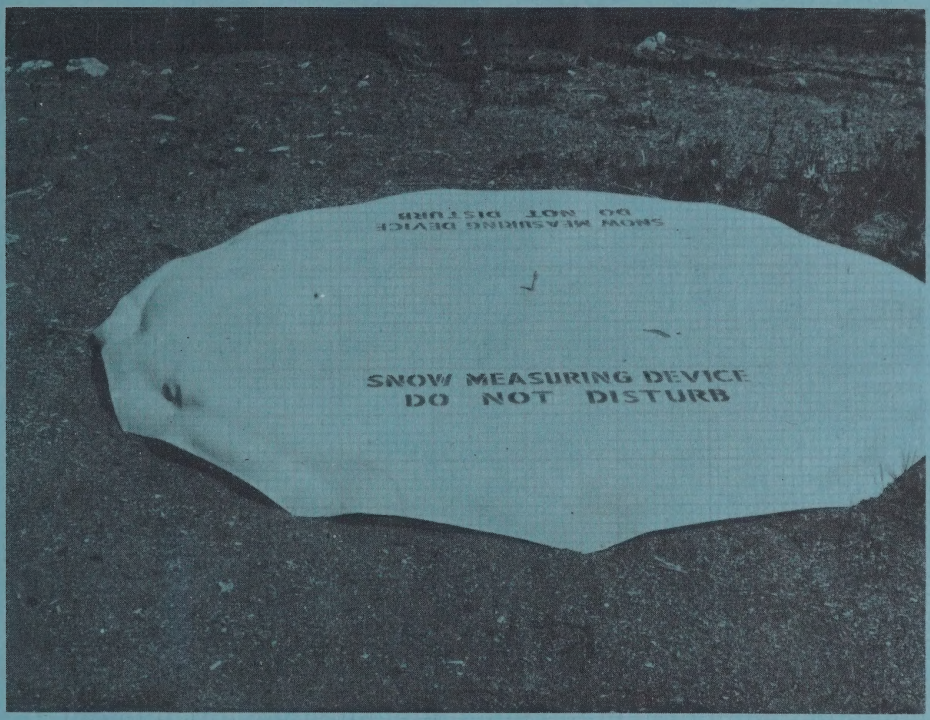
RESERVOIR STORAGE DATA

AS OF APRIL 30, 1957

(1,000 Acre Feet)

No.	Reservoir	Storage Capacity	Year Year	Last Year	Average
0008	Clarks Ferry	2,000.0	1,020.0	1,470.0	1,377.4
0043	Lake Granby	10.4	10.2	10.7	8.6
0044	Lake Nr. Big Thompson	61.9	61.9	62.4	47.7
0050	Horsetooth Dam	41.9	33.4	36.1	31.0
0050	Lake Steven	10.7	7.5	10.6	5.1

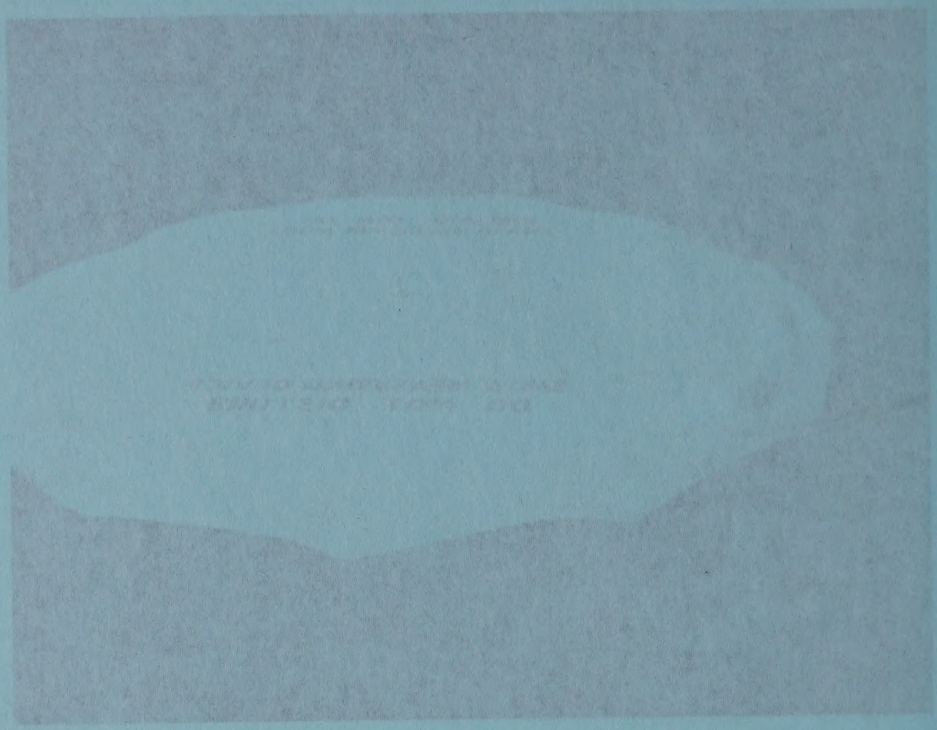
THE SNOW PILLOW



Snow Pillow installation at Lick Creek, Montana

During the past few years the Soil Conservation Service has tested snow measuring devices for obtaining a continuous record of snow accumulation and melt. The most versatile and promising is the nylon reinforced butyl or neoprene snow pillow, which is usually about 12 feet in diameter and filled with a methanol alcohol-water solution to a depth of three inches. The pillow is placed on a level ground surface. A hose connects the pillow to a manometer or pressure transducer in an instrument shelter. As snow falls on the pillow the amount of fluid rise in the manometer is equivalent to the water content in the snow pack. A water level recorder installed in the manometer provides a continuous record of the snow water content. Telemetered (transmitted by radio signal) information is obtained by connecting a pressure transducer to the pillow. The signal from the transducer is converted to equivalent inches of water content at the receiving station. Air temperature, total precipitation, soil moisture and soil temperature can be telemetered, in addition to snow water content.

USDA-SCS-PORTLAND, OREG. 1967

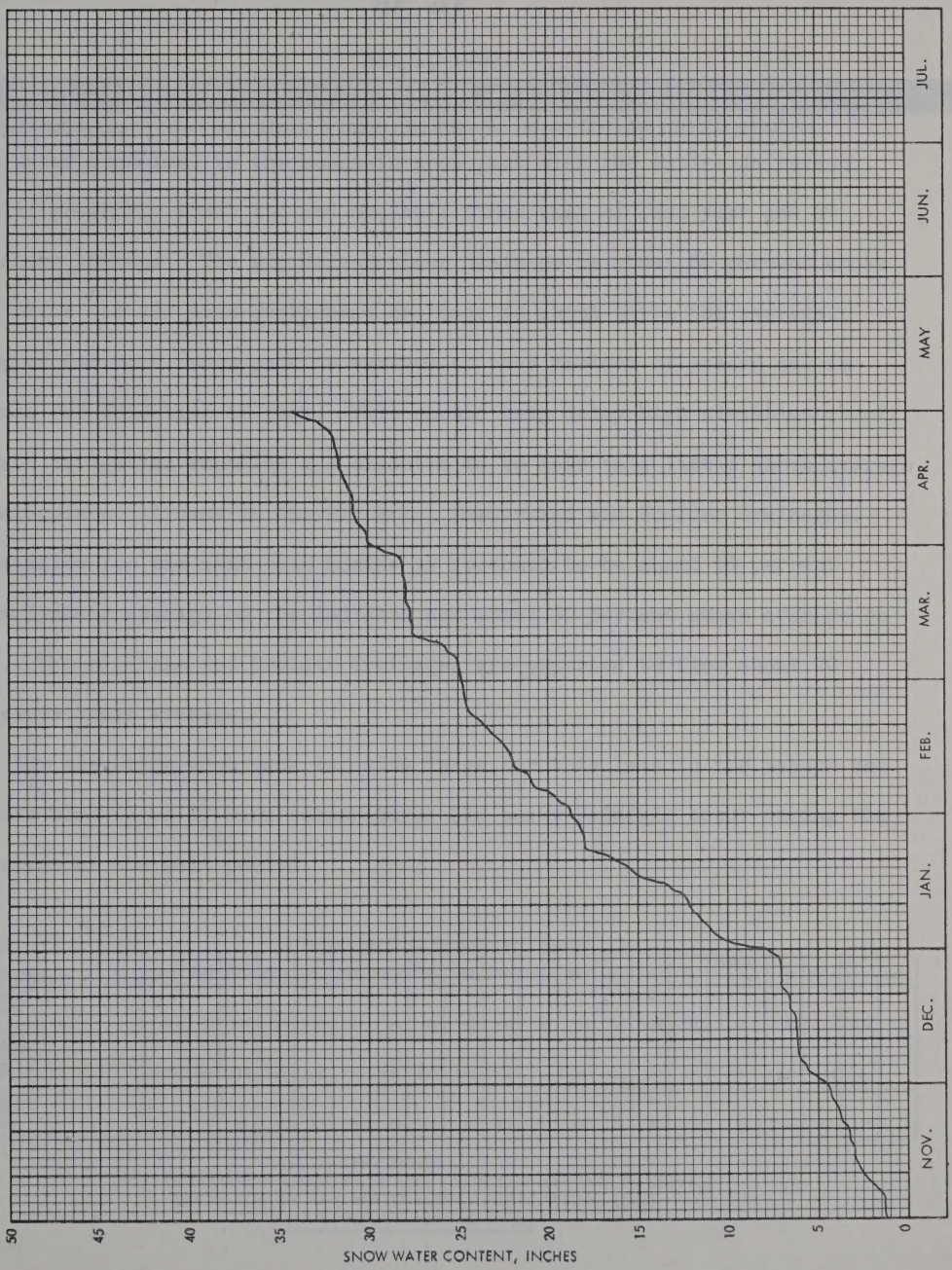


SPUR PARK
SNOW PILLOW DATA

AS OF MAY 1, 1967

Sec. 20 T. 12N R. 9E No. 10C06 Drainage: Judith

Lat. 46-47 Long. 110-37 Elev. 8000



WATER SUPPLY OUTLOOK

JEFFERSON RIVER and TRIBUTARY BASINS

MONTANA

as of

MAY 1, 1967

UNITED STATES DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

Data included in this report were obtained in cooperation with other Federal, State and private organizations

The water contained in the mountain snow pack over the entire Jefferson drainage is presently about two and one-half times that of last year and 69 percent above average. The Big Hole-Boulder drainage is about 60 percent above average, while the Red Rock-Beaverhead drainage is about twice the average. In the upper Red Rock, snow pack is maximum or near maximum of record and is quite dense for this time of year. This should help delay high elevation runoff. Late season irrigation supplies are expected to be near to a little above average on the unregulated streams in the Big Hole, Beaverhead and Boulder drainages.

Streamflow for the next five months is forecast to be about 50 percent above the 1948-62 average on the Red Rock and about 30 percent above average on the Ruby. The Big Hole and Boulder drainages are expected to flow about 20 percent above their average.

The low elevation snow pack is quite large for this late in the season and could cause high flows if warm temperatures and heavy rainfall occur during the early portion of the melt period.

STREAMFLOW (APRIL THROUGH SEPTEMBER)

STREAM GAGING STA.	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1948-62 Average	1963	1964	1965	1966
STATION NO. 0215 RED ROCK RIVER NEAR MONIDA	81	78	100	70	127	81	58	71	60	105	93	54	55	36	110	78	60	110	136	
STATION NO. 0255 BIG HOLE RIVER NEAR MELROSE	1159	749	778	861	808	745	541	592	842	720	714	645	556	397	671	718	681	849	1166	
STATION NO. 0330 BOULDER RIVER NEAR BOULDER	136	65	81	92	85	84	49	73	76	67	82	68	73	46	70	76	81	108	139	

Report prepared by

U. S. DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE
SNOW SURVEY AND WATER SUPPLY FORECASTING UNIT
BOX 98, BOZEMAN, MONTANA 59715

"The Conservation of Water begins with the Snow Survey"

JEFFERSON RIVER and TRIBUTARY BASINS

WATERSHED LOCATION

LEGEND

- Snow Pillow
- Precipitation Gage
- Snow Survey Course
- Soil Moisture Station
- Snow Course and Soil Moisture Station
- Aerial Marker at Snow Course
- Stream Gaging Station
- Drainage
- S.W.C.D. Boundary
- Watershed Boundary
- Highway
- Town
- County Boundary
- State Boundary

15 0 15 30
SCALE IN MILES

SNOW SURVEY DATA

WATERSHED 8

AS OF MAY 1, 1967

(Inches)

SNOW COURSE			CURRENT DATA			PAST RECORD	
						WATER CONTENT	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE
13D20	Abundance Lake	8800	4/23	67	24.3	14.8	-
12C07	Berry Meadow	7300	4/28	50	14.2	5.1	6.7*
13D10	Bloody Dick	7600	5/2	53	16.0	4.6	-
11D07	Call Road	8050	4/23	47	16.0	11.1	-
13C05	Chessman Reservoir	6200	4/26	24	7.8	0.6	2.9
11D08	Clover Meadow	8600	4/23	62	23.6	17.0	-
13E22	Dad Creek Lake	8400	4/23	56	18.6	12.0	-
13D19	Darkhorse Lake	8600	4/23	81	32.4	19.2	-
12E07	Divide	7900	4/23	43	14.2	6.4	-
13D15	Elk Horn Springs	7800	4/25	38	11.4	4.9	8.4*
13D21	Foolhen	8280	4/23	65	23.9	11.7	-
11D12	Four Mile	6900	5/1	40	11.3	4.3	-
13D02	Gibbons Pass	7100	4/27	71	27.2	12.8	23.1
13D09	Gold Stone	8100	5/2	68	22.1	9.9	-
13D08	Jahnke Creek	7340	5/2	41	12.4	1.8	-
11E04	Lakeview Canyon	6930	4/28	51	19.6	9.7	9.5*
11E03	Lakeview Ridge	7400	4/28	52	18.8	7.6	7.3*
11D11	Lower Twin	7900	5/1	82	26.8	19.4	-
11D03	North Meadow	7500	5/1	58	14.0	8.4	-
12E06	Notch	8500	4/23	59	20.5	16.6	-
12D01	Pipestone Pass	7200	5/3	54	13.8	1.9	4.4*
13D22	Saddle Mountain	7940	4/27	85	31.6	18.4	-
13C07	Storm Lake	7780	4/29	68	21.6	11.2	17.0*
12C02	Ten Mile Lower	6600	4/26	33	11.2	1.8	4.1
12C03	Ten Mile Middle	6800	4/25	48	16.4	7.7	9.9
12C04	Ten Mile Upper	8000	4/25	53	19.9	10.1	14.2
11E27	Upper West Fork	8750	4/25	55	21.8	11.6	-
12E01	White Pine Ridge	8850	4/23	26	7.5	0.0	-

SOIL MOISTURE DATA

AS OF MAY 1, 1967

(Inches)

SOIL MOISTURE STATION			SOIL PROFILE		CURRENT DATA		PAST RECORD	
NO.	NAME	ELEVATION	DEPTH	FIELD CAPACITY	DATE OF SURVEY	SOIL MOISTURE	LAST YEAR	**AVERAGE
13D18M	Gibbons Pass	7100	48	7.1	4/26	4.9	6.2	6.3
11E13M	Lakeview	6700	48	15.3	5/2	9.6	15.1	15.2

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD). *ADJUSTED AVERAGE **AVERAGE FOR PERIOD OF RECORD

WATER SUPPLY FORECASTS

WATERSHED 8

AS OF MAY 1, 1967

(1000 Acre Feet)

NO.	RIVER AND FORECAST POINT	FORECAST PERIOD	FORECAST THIS YEAR	PERCENT AVERAGE	MEASURED FLOW LAST YEAR*	MEASURED FLOW AVERAGE
0110	RED ROCK RIVER Kennedy Ranch (at)	May-Sept	78.0	157	31.3	49.8
0125	RED ROCK RIVER Monida (near)(11)	May-Sept	85.0	155	33.5	54.9
0195	RUBY RIVER Alder (near)	May-Sept	90.0	129	51.7	69.9
0255	BIG HOLE RIVER Melrose (near)	May-Sept	750	120	217	625
0260	BIRCH CREEK Glen (near)	May-Sept	13.4	116	6.0	12.3
0330	BOULDER RIVER Boulder (near)	May-Sept	80.0	120	42.8	66.4
0345	JEFFERSON RIVER Sappington (at)(12)	May-Sept	1030	125	198	824

(11) Adjusted for storage in Lima Reservoir.
(12) Adjusted for storage in Clark Canyon Reservoir.

*PROVISIONAL DATA FURNISHED BY U. S. GEOLOGICAL SURVEY

RESERVOIR STORAGE DATA

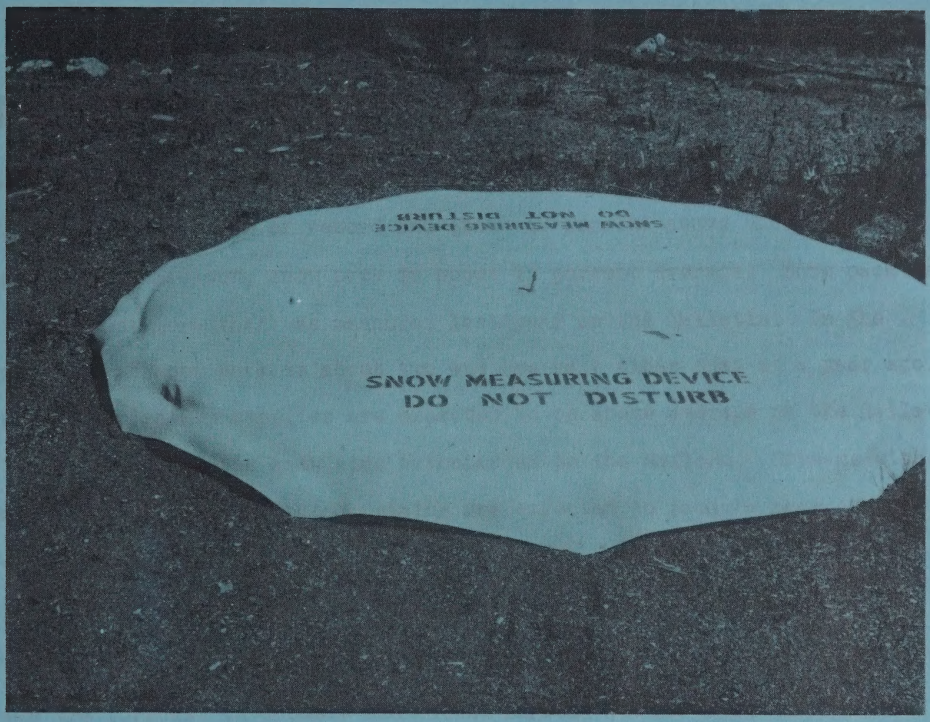
AS OF APRIL 30, 1967

(1000 Acre Feet)

NO.	RESERVOIR	USABLE CAPACITY	THIS YEAR	LAST YEAR	AVERAGE
0120	Lima	84.0	24.6	67.6	48.3
0153	Clark Canyon	328.9	120.1	158.1	-
0205	Ruby	38.8		36.9	31.7

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD).

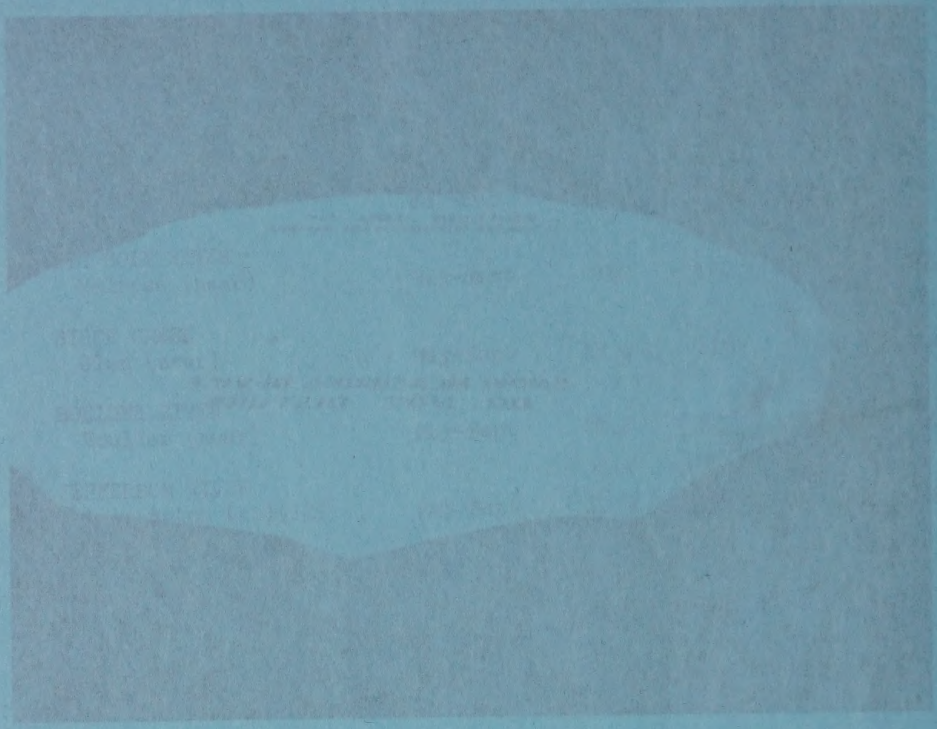
THE SNOW PILLOW



Snow Pillow installation at Lick Creek, Montana

During the past few years the Soil Conservation Service has tested snow measuring devices for obtaining a continuous record of snow accumulation and melt. The most versatile and promising is the nylon reinforced butyl or neoprene snow pillow, which is usually about 12 feet in diameter and filled with a methanol alcohol-water solution to a depth of three inches. The pillow is placed on a level ground surface. A hose connects the pillow to a manometer or pressure transducer in an instrument shelter. As snow falls on the pillow the amount of fluid rise in the manometer is equivalent to the water content in the snow pack. A water level recorder installed in the manometer provides a continuous record of the snow water content. Telemetered (transmitted by radio signal) information is obtained by connecting a pressure transducer to the pillow. The signal from the transducer is converted to equivalent inches of water content at the receiving station. Air temperature, total precipitation, soil moisture and soil temperature can be telemetered, in addition to snow water content.

USDA-SCS-PORTLAND, OREG. 1967



WATER SUPPLY OUTLOOK

MADISON and GALLATIN RIVER BASINS

MONTANA

as of
MAY 1, 1967

UNITED STATES DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

Data included in this report were obtained in cooperation with other Federal, State and private organizations

Water stored in the high elevation snow pack in the Gallatin drainage is fourth highest to maximum of record and about 40 percent above the 1948-62 average. In the Madison, snow pack is about 75 percent average. Snow pack is about 65 percent more than was measured last year on the Gallatin. In the Madison, present snow pack is about two and one-half times that of a year ago. Late season irrigation supplies are expected to be above average on the Gallatin River tributaries and the east side tributaries to the Madison. Streams with headwaters in the Tobacco Root Mountains are expected to produce near average late season irrigation supplies.

Streamflow for the next five months is forecast to be the fourth highest of record for the last 30 years on the Madison. Streams in the Gallatin River drainage are forecast to produce the second highest volume of record for the last 30 years, or a little below the high volumes produced in 1965.

The low elevation snow is quite large for this late date and could result in some high flows should temperatures warm rapidly. If rainfall is heavy during the main melt season, high flows can be expected.

STREAMFLOW (APRIL THROUGH SEPTEMBER)

STREAM GAGING STA.	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1948-62 Average	1963	1964	1965	1966
STATION NO. 0385 MADISON RIVER NEAR GRAYLING	406	424	444	468	563	434	420	345	489	454	359	366	327	329	468	420	430	474	577	
STATION NO. 0435 GALLATIN RIVER NEAR GALLATIN GATEWAY	566	393	454	399	596	404	365	350	499	469	384	507	416	331	577	447	455	551	649	
STATION NO. 0485 BRIDGER CREEK NEAR BOZEMAN	42	12	19	19	28	27	12	17	19	14	15	24	21	9	21	20	28	24	31	

Report prepared by
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SNOW SURVEY AND WATER SUPPLY FORECASTING UNIT
BOX 98, BOZEMAN, MONTANA 59715

"The Conservation of Water begins with the Snow Survey"

MADISON and GALLATIN RIVER BASINS

SNOW SURVEY DATA

WATERSHED 9

AS OF MAY 1, 1967

(Inches)

SNOW COURSE			CURRENT DATA			PAST RECORD	
						WATER CONTENT	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE
10D14	Arch Falls	7350	5/1	58	18.7	11.6	12.0*
11D09	Bear Basin	8150	4/27	66	27.4	17.2	22.6*
10D15	Bridger Bowl Pillow	7250	4/28	SP	35.2	24.8	-
11D07	Call Road	8050	4/23	47	16.0	11.1	-
10E03	Canyon	7750	4/28	60	24.1	12.8	13.5*
11E29	Carrot Basin Pillow	9000	4/24	SP	41.5	-	-
11D08	Clover Meadow	8600	4/23	62	23.6	17.0	-
10D04	Devil's Slide	8100	5/1	89	30.2	22.2	24.9
11D12	Four Mile	6900	5/1	40	11.3	4.3	-
11E25	Freezeout Lake	7200	4/26	31	10.6	0.8	-
11E26	Freezeout Mountain	8250	4/26	61	24.0	14.0	-
11E05	Hebgen Dam	6550	4/29	34	11.5	0.5	4.8
10D03	Hood Meadow	6600	5/1	40	13.4	5.2	6.6
11E22	Lake Creek	6100	4/26	17	6.4	0.0	-
10D13	Lick Creek Pillow	6860	4/28	SP	13.0	6.8	-
11E28	Lion Mountain Pillow	8760	4/25	SP	21.3	-	-
11D10	Little Park	7400	4/27	54	20.8	13.0	16.0*
11D11	Lower Twin	7900	5/1	82	26.8	19.4	-
10D18	Maynard Creek Pillow	6210	4/28	SP	15.6	-	-
11E23	Meridian Creek	7000	4/26	38	12.2	3.7	-
10E22	Norris Basin	7500	5/2	41	14.7	0.0	5.5*
11D03	North Meadow	7500	5/1	58	14.0	8.4	-
11E21	Potomageton Park	7150	4/27	40	17.2	4.9	-
10D10	Sacajawea	6550	4/28	42	17.9	11.4	10.8*
11E20	Sentinel Creek	8300	4/27	79	33.8	18.3	-
10D16	Shower Falls Pillow	8100	5/1	SP	31.3	25.4	-
11D13	Taylor Peaks Pillow	8500				-	-
11E24	Tepee Creek	8000	4/25	61	21.9	11.5	-
11E06	Twenty-One Mile	7150	4/30	66	25.6	12.8	14.9
11E27	Upper West Fork	8750	4/25	55	21.8	11.6	-
11E07	West Yellowstone	6700	4/30	41	15.6	1.4	5.6
11E07	West Yellowstone Pillow	6700	4/28	SP	13.4	-	-

SP - Snow pillow observation - water content only.

SOIL MOISTURE DATA

AS OF MAY 1, 1967

(Inches)

SOIL MOISTURE STATION			SOIL PROFILE		CURRENT DATA		PAST RECORD	
NO.	NAME	ELEVATION	DEPTH	FIELD CAPACITY	DATE OF SURVEY	SOIL MOISTURE	LAST YEAR	**AVERAGE
10D11M	Battle Ridge	6020	48	17.6	5/2	15.0	15.6	15.5
10D15M	Bridger Bowl	7250	48	15.8	4/28	15.8	16.4	-
11D02M	College Site	4856	54	14.5	5/1	14.9	14.8	12.5
10D13M	Lick Creek	6860	48	18.8	4/28	18.9	19.0	-
11D04M	Red Bluff	4800	40	4.7	5/1	2.2	2.3	2.5
11E06M	Twenty-One Mile	7150	48	10.0	4/28	2.9	3.4	3.5
11E07	West Yellowstone	6700	48	6.5	4/28	3.6	-	-

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD). *ADJUSTED AVERAGE **AVERAGE FOR PERIOD OF RECORD

WATER SUPPLY FORECASTS

WATERSHED 9

AS OF MAY 1, 1967

(1000 Acre Feet)

NO.	RIVER AND FORECAST POINT	FORECAST PERIOD	FORECAST THIS YEAR	PERCENT AVERAGE	MEASURED FLOW LAST YEAR*	MEASURED FLOW AVERAGE
0375	MADISON RIVER West Yellowstone (near)	May-Sept	218	122	165	179
0385	MADISON RIVER Grayling (near)(13)	May-Sept	470	129	319	364
0410	MADISON RIVER McAllister (near)(14)	May-Sept	830	133	516	623
0435	GALLATIN RIVER Gateway (near)	May-Sept	618	148	359	418
0485	BRIDGER CREEK Bozeman (near)	May-Sept	27.0	164	13.5	16.5
0500	HYALITE CREEK Bozeman (near)(15)	May-Sept	49.5	152	35.2	32.6
0525	GALLATIN RIVER Logan (at)	May-Sept	675	169	261	400
0545	MISSOURI RIVER Toston (at)(16)	May-Sept	2450	135	812	1816

(13) Adjusted for storage in Hebgen Lake.
(14) Adjusted for storage in Hebgen and Ennis Lakes.
(15) Adjusted for storage in Middle Creek Reservoir.
(16) Adjusted for storage in Hebgen and Ennis Lakes and Clark Canyon Reservoir.

*PROVISIONAL DATA FURNISHED BY U. S. GEOLOGICAL SURVEY

RESERVOIR STORAGE DATA

AS OF APRIL 30, 1967

(1000 Acre Feet)

NO.	RESERVOIR	USABLE CAPACITY	THIS YEAR	LAST YEAR	AVERAGE
0380	Hebgen Lake	377.5	221.4	266.8	174.8
0405	Ennis Lake	41.0	38.7	39.0	34.9
0495	Middle Creek	8.0	3.8	3.3	4.6

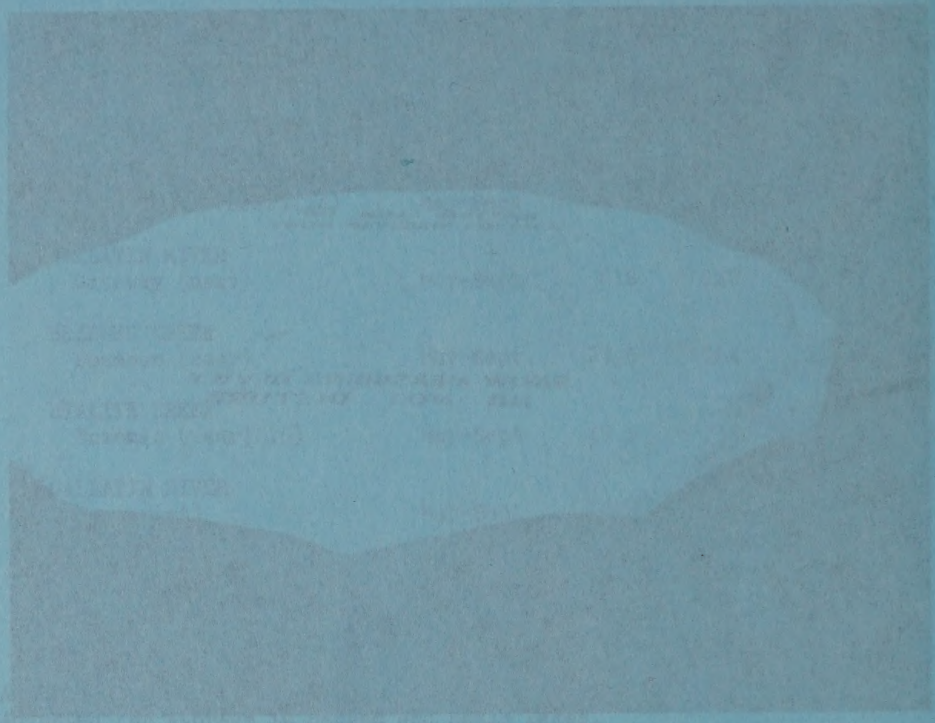
NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD).

THE SNOW PILLOW

Snow Pillow installation at Lick Creek, Montana

During the past few years the Soil Conservation Service has tested snow measuring devices for obtaining a continuous record of snow accumulation and melt. The most versatile and promising is the nylon reinforced butyl or neoprene snow pillow, which is usually about 12 feet in diameter and filled with a methanol alcohol-water solution to a depth of three inches. The pillow is placed on a level ground surface. A hose connects the pillow to a manometer or pressure transducer in an instrument shelter. As snow falls on the pillow the amount of fluid rise in the manometer is equivalent to the water content in the snow pack. A water level recorder installed in the manometer provides a continuous record of the snow water content. Telemetered (transmitted by radio signal) information is obtained by connecting a pressure transducer to the pillow. The signal from the transducer is converted to equivalent inches of water content at the receiving station. Air temperature, total precipitation, soil moisture and soil temperature can be telemetered, in addition to snow water content.

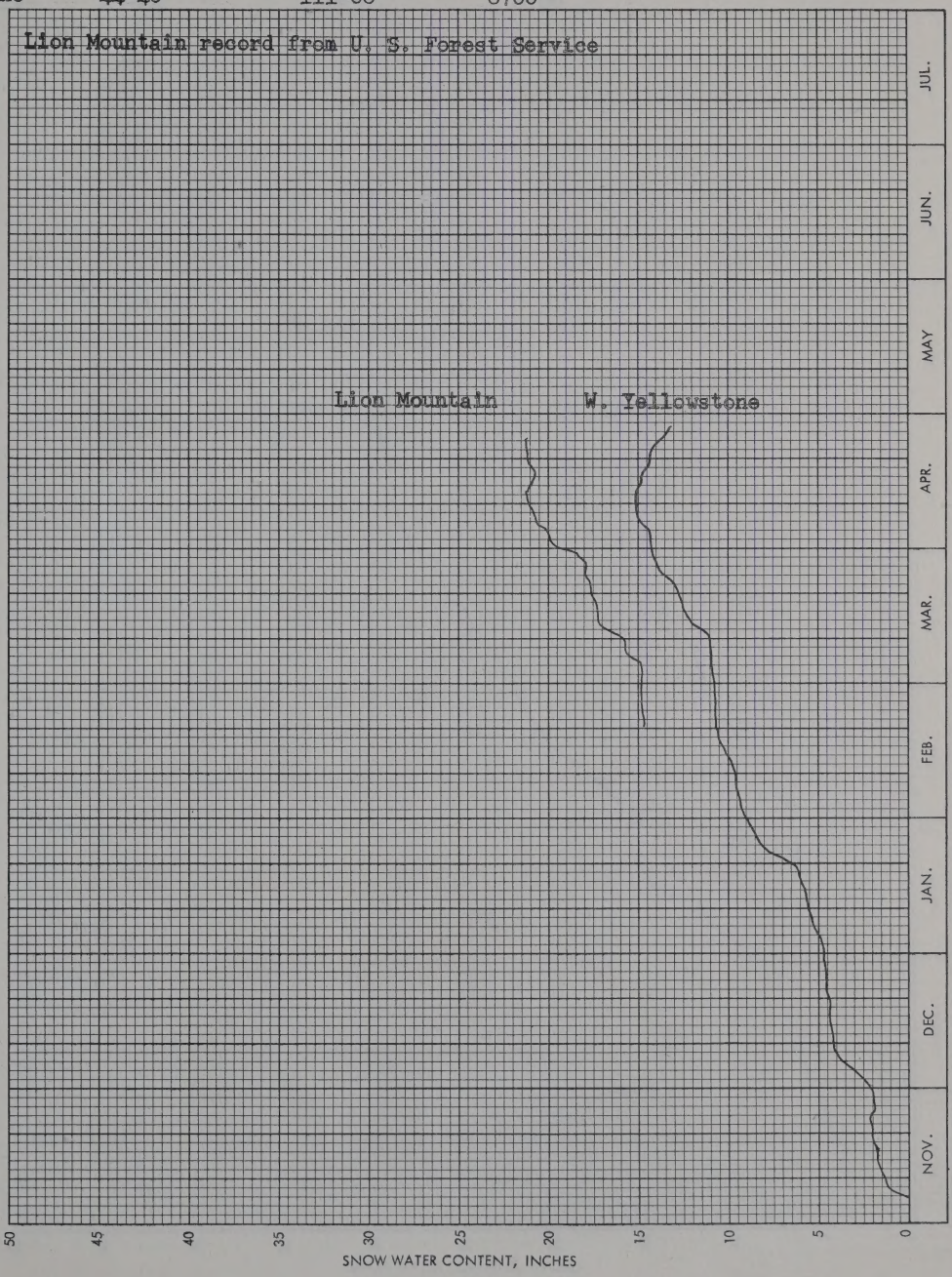
USDA-SCS-PORTLAND, OREG. 1967



LION MOUNTAIN & W. YELLOWSTONE
SNOW PILLOW DATA

AS OF MAY 1, 1967

Lion Mountain -	Sec. 23	T. 11S	R. 2W	No. 11E28	Drainage: Madison
W. Yellowstone -	34	13S	5E	11E07	
Lion Mountain -	Lat. 44-52		Long. 111-48	Elev. 8760	
W. Yellowstone -	44-40		111-06	6700	

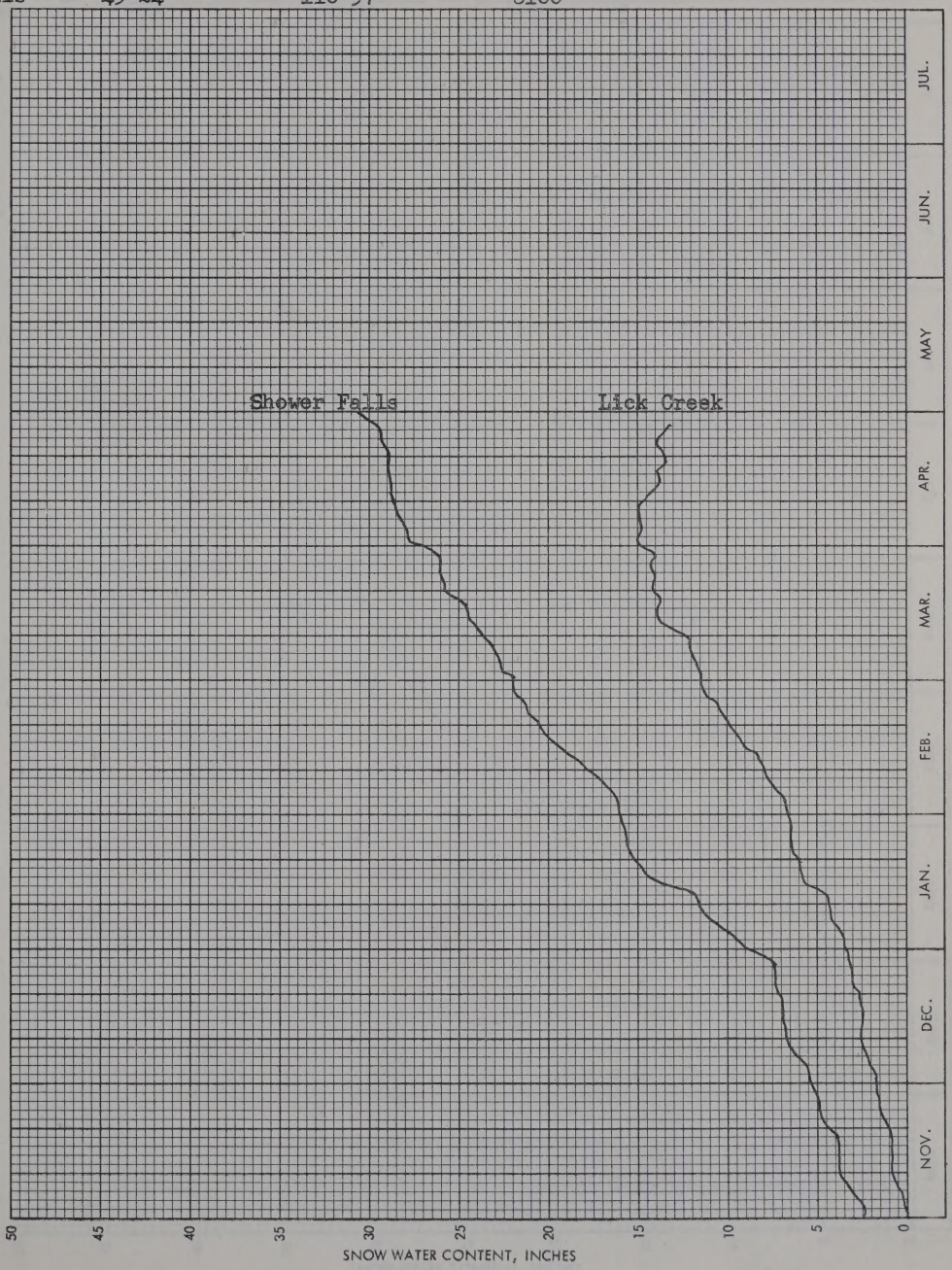


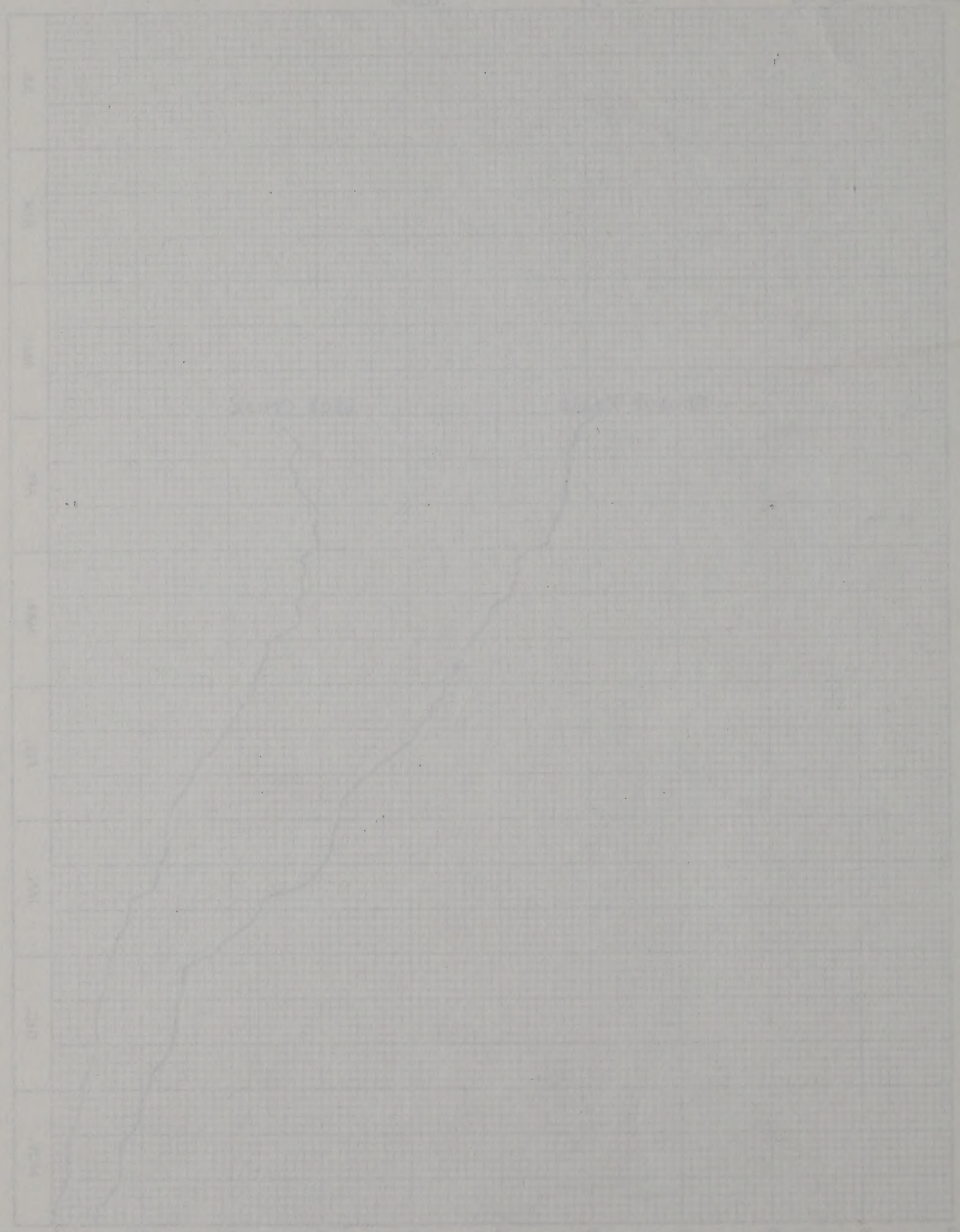
LICK CREEK & SHOWER FALLS
SNOW PILLOW DATA

AS OF MAY 1, 1967

	Sec.	T.	R.	No.	Drainage:
Lick Creek -	10	4S	6E	10D13	Gallatin
Shower Falls-	14	5S	6E	10D16	

	Lat.	Long.	Elev.
Lick Creek -	45-30	110-58	6860
Shower Falls-	45-24	110-57	8100

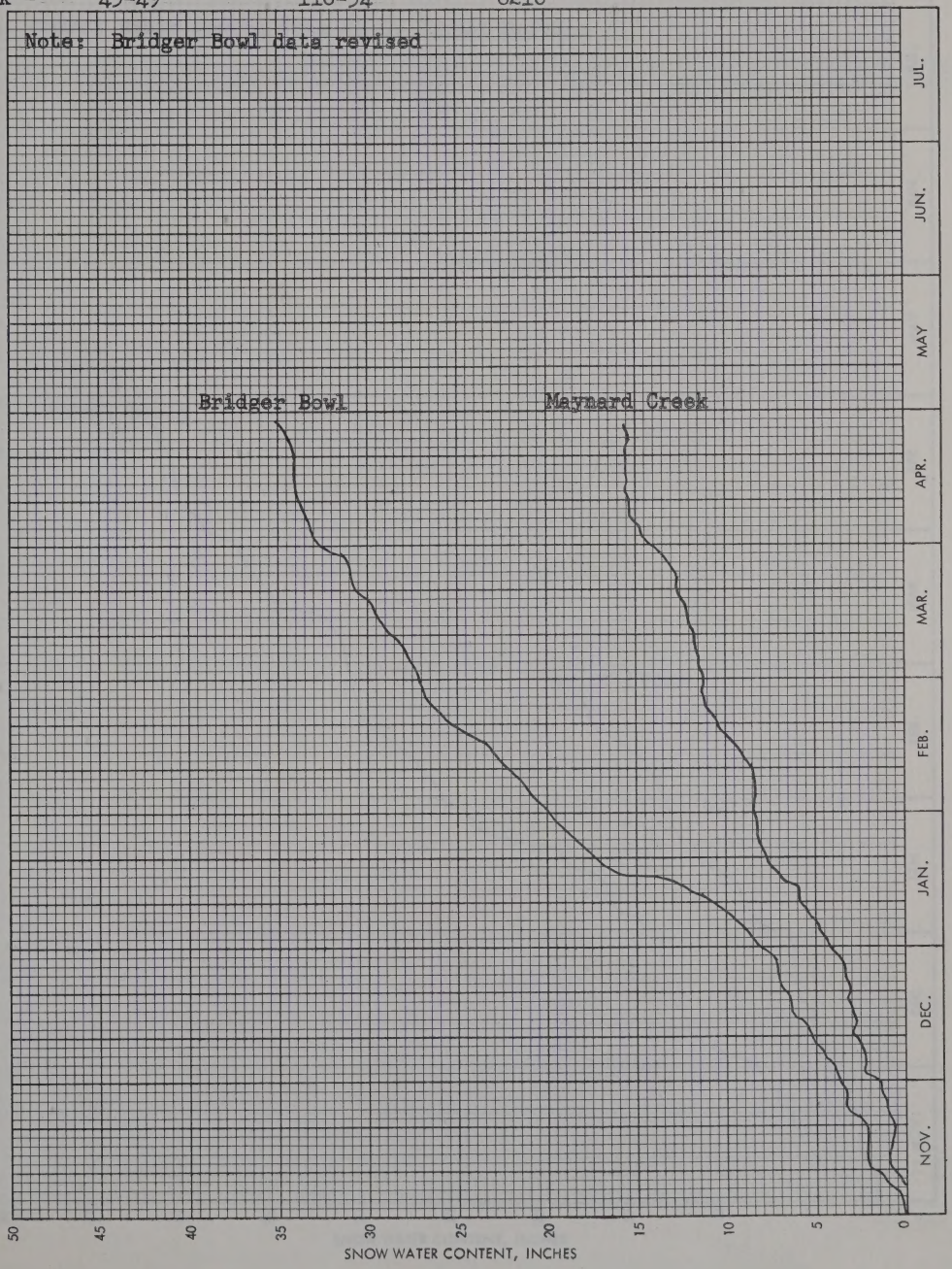


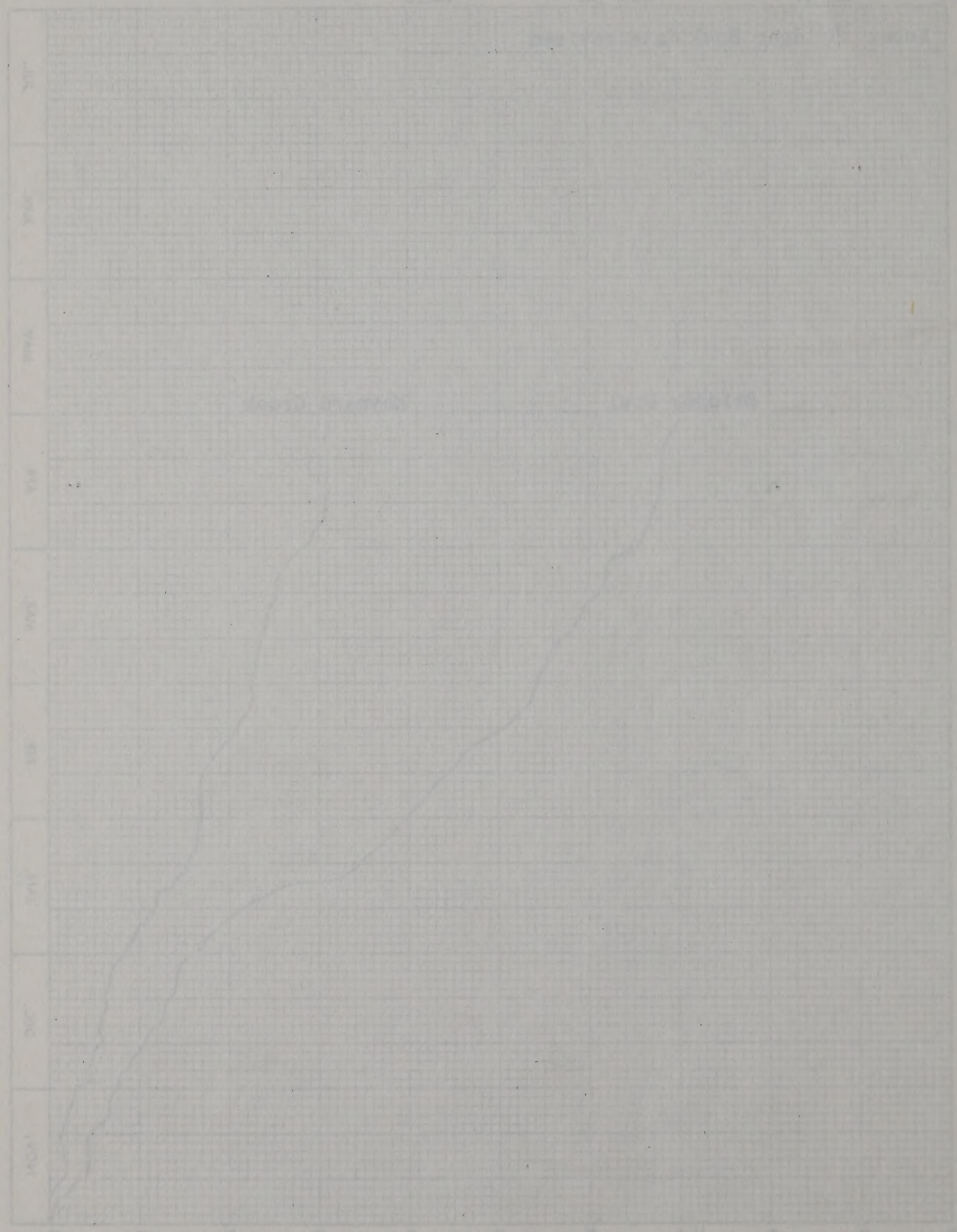


BRIDGER BOWL & MAYNARD CREEK
SNOW PILLOW DATA

AS OF MAY 1, 1967

Bridger Bowl -	Sec. 25	T. 1N	R. 6E	No. 10D15	Drainage: Gallatin
Maynard Creek -	19	1N	7E	10D18	
Bridger Bowl -	Lat. 45-48	Long. 110-55	Elev. 7250		
Maynard Creek -	45-49	110-54	6210		

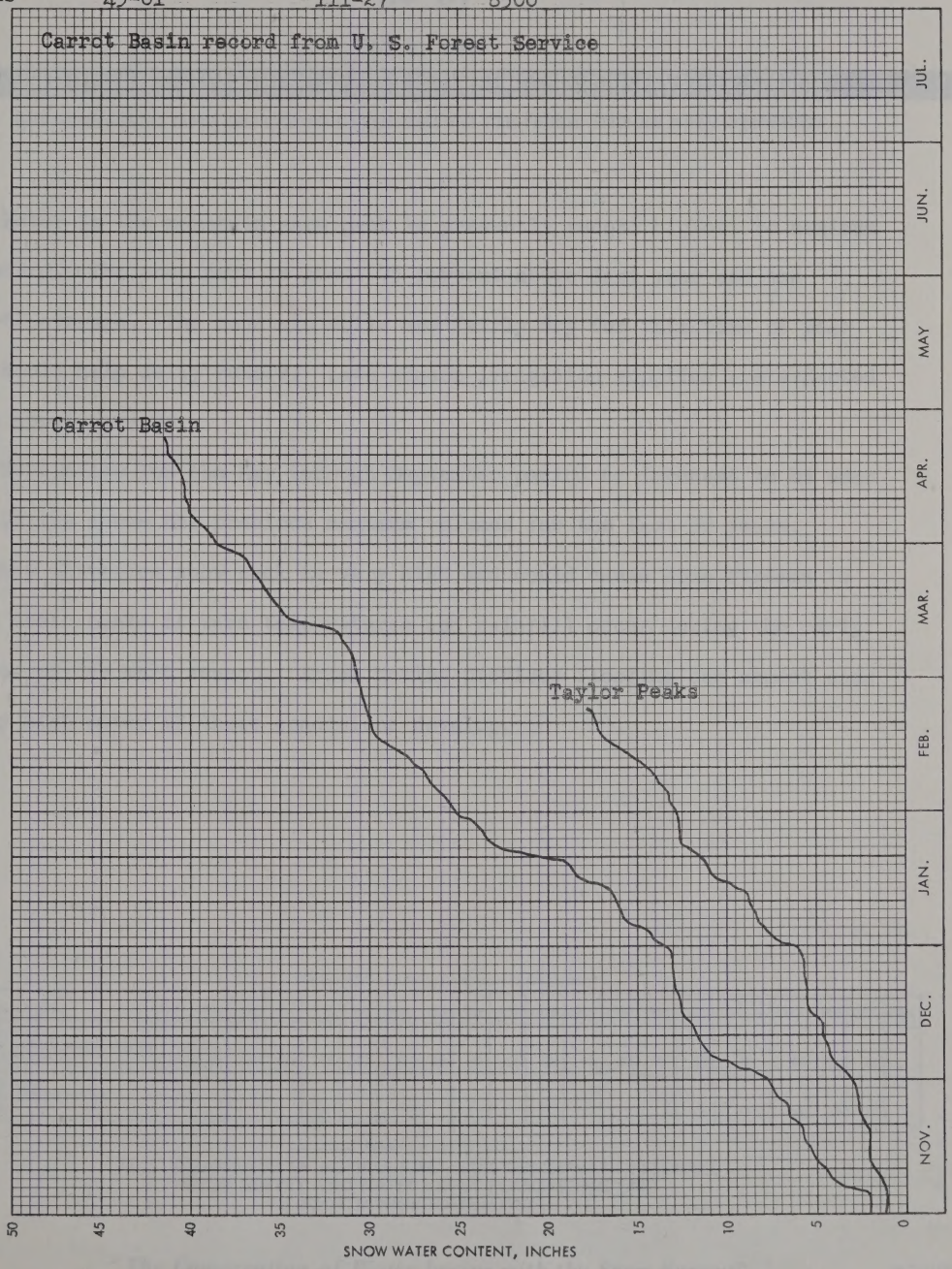


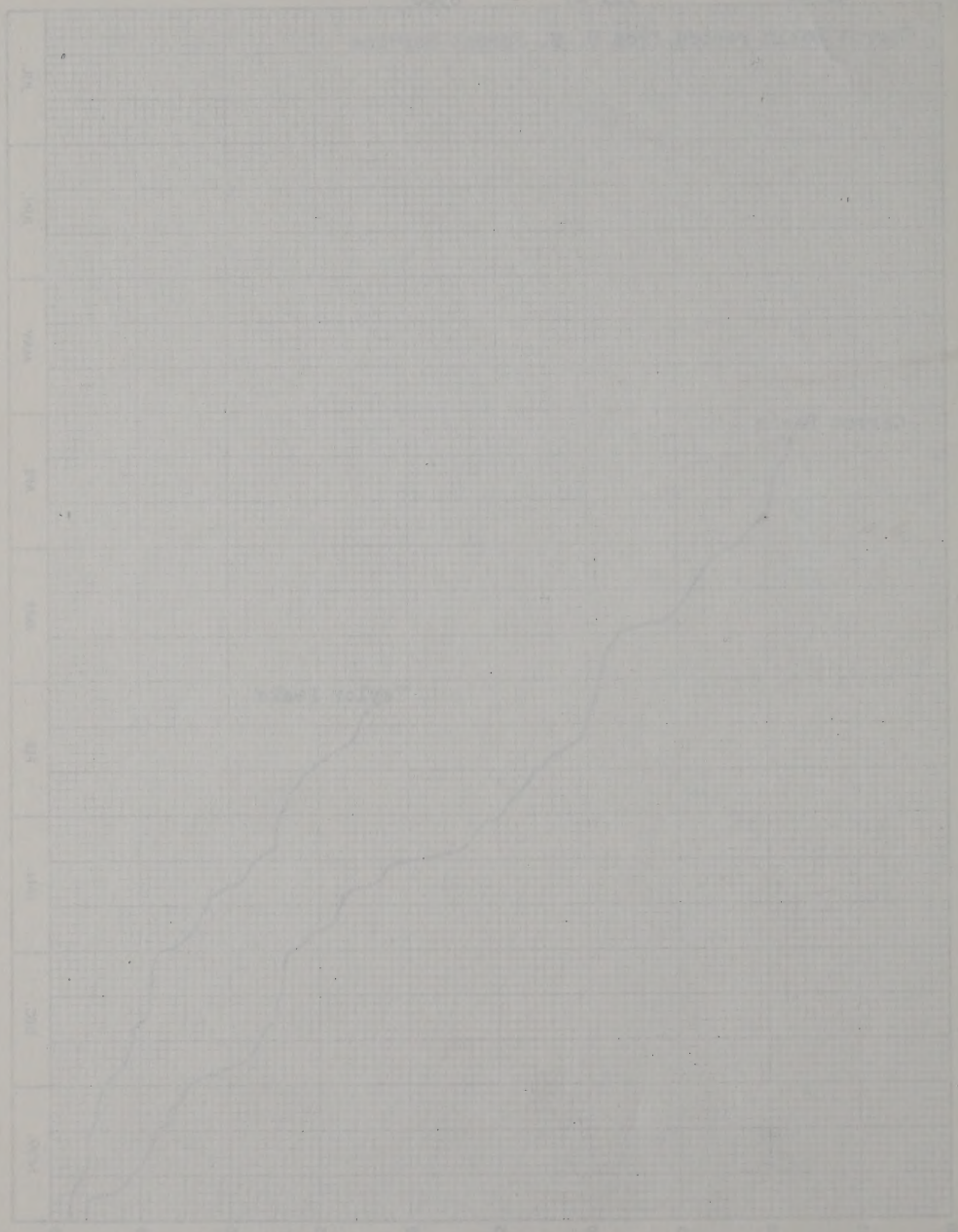


CARROT BASIN & TAYLOR PEAKS
SNOW PILLOW DATA

AS OF MAY 1, 1967

Carrot Basin -	Sec. 18	T. 10S	R. 4E	No. 11E29	Drainage: Gallatin
Taylor Peaks -	26	9S	2E	11D13	
Carrot Basin -	Lat. 44-58	Long. 111-58	Elev. 9000		
Taylor Peaks	45-01	111-27	8500		





WATER SUPPLY OUTLOOK

JUDITH and MUSSELSHELL RIVER BASINS

MONTANA

as of

MAY 1, 1967

UNITED STATES DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

Data included in this report were obtained in cooperation with other Federal, State and private organizations

Water in the mountain snow pack is presently second highest to maximum of record. The snow pack is about 75 percent above last year and the 1948-62 average. The mountain soils are fairly dry for this time of year and should help delay runoff. Late season irrigation supplies are expected to be above average.

Streamflow for the May through September period is forecast to be near to a little above the previous maximum volumes for the last 30 years.

Low elevation snow pack is very high and could cause some streams to leave their banks if warm temperatures and rainfall occur during the early portion of the melt season. Areas having previous flooding can expect some fairly high water if these conditions develop.

STREAMFLOW (APRIL THROUGH SEPTEMBER)

STREAM GAGING STA	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1948-62 Average	1963	1964	1965	1966
STATION NO. 1185 SOUTH FORK MUSSELSHELL RIVER ABOVE MARTINSDALE	97	49	68	54	79	55	27	25	47	56	26	57	32	11	50	49	45	56	74	
STATION NO. 1098 SOUTH FORK JUDITH RIVER NEAR UTICA												13	9	3	14	12	10	19	17	

Report prepared by

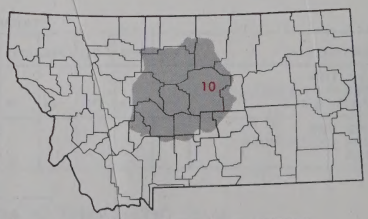
U. S. DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE
SNOW SURVEY AND WATER SUPPLY FORECASTING UNIT
BOX 98, BOZEMAN, MONTANA 59715

"The Conservation of Water begins with the Snow Survey"

JUDITH and MUSSELSHELL RIVER BASINS

LEGEND

- Snow Pillow
- Precipitation Gage
- Snow Survey Course
- Soil Moisture Station
- Snow Course and Soil Moisture Station
- Aerial Marker at Snow Course
- Stream Gaging Station
- Drainage
- S.W.C.D. Boundary
- Watershed Boundary
- Highway
- Town
- County Boundary
- State Boundary



WATERSHED LOCATION

SNOW SURVEY DATA

WATERSHED 10

AS OF MAY 1, 1967

(Inches)

SNOW COURSE			CURRENT DATA			PAST RECORD	
						WATER CONTENT	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE
9C02	Avalanche	7100	5/4	94	33.7	21.7	-
10C05	Bald Ridge	7500	5/2	49	17.7	10.0	-
9C01	Crystal Lake	6100	5/4	53	21.4	9.2	-
10C09	Deadman Creek	6450	5/3	48	18.8	5.6	-
10C07	Elk Peak	8000	5/2	83	28.7	17.2	16.5*
10C02	Grasshopper	7000	5/2	38	11.1	4.2	-
10C01	Kings Hill	7500	4/28	65	22.9	12.4	13.8
10C03	Porcupine R.S.	6500	5/2	34	11.3	5.2	-
9C03	Rock Creek	5600	5/4	40	13.9	5.1	-
10C08	South Fork Shields	8100	5/2	85	33.6	26.3	-
10C06	Spur Park	8000	5/3	95	36.3	20.4	20.0*
10C06	Spur Park Pillow	8000	5/3	SP	34.6	-	-

SP - Snow pillow observation - water content only.

SOIL MOISTURE DATA

AS OF MAY 1, 1967

(Inches)

SOIL MOISTURE STATION			SOIL PROFILE		CURRENT DATA		PAST RECORD	
NO.	NAME	ELEVATION	DEPTH	FIELD CAPACITY	DATE OF SURVEY	SOIL MOISTURE	LAST YEAR	**AVERAGE
10C01M	Kings Hill	7420	48	11.8	5/3	4.7	8.8	8.3

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD). *ADJUSTED AVERAGE **AVERAGE FOR PERIOD OF RECORD

WATER SUPPLY FORECASTS

WATERSHED 10

AS OF MAY 1, 1967

(1000 Acre Feet)

NO.	RIVER AND FORECAST POINT	FORECAST PERIOD	FORECAST THIS YEAR	PERCENT AVERAGE	MEASURED FLOW LAST YEAR*	MEASURED FLOW AVERAGE
	JUDITH RIVER					
1100	Utica (near)	May-Sept	67.0	205		32.7
	MISSOURI RIVER					
1150	Zortman (near)(21)	May-Sept	5060	130	2254	3885
	N. FORK MUSSELSHELL RIVER					
1155	Delpine (near)	May-Sept	9.0	180	3.1	5.0
	S. FORK MUSSELSHELL RIVER					
1185	Martinsdale (above)	May-Sept	70.0	163	37.3	42.8

(21) Adjusted for storage in Canyon Ferry and Tiber Reservoirs.

*PROVISIONAL DATA FURNISHED BY U. S. GEOLOGICAL SURVEY

RESERVOIR STORAGE DATA

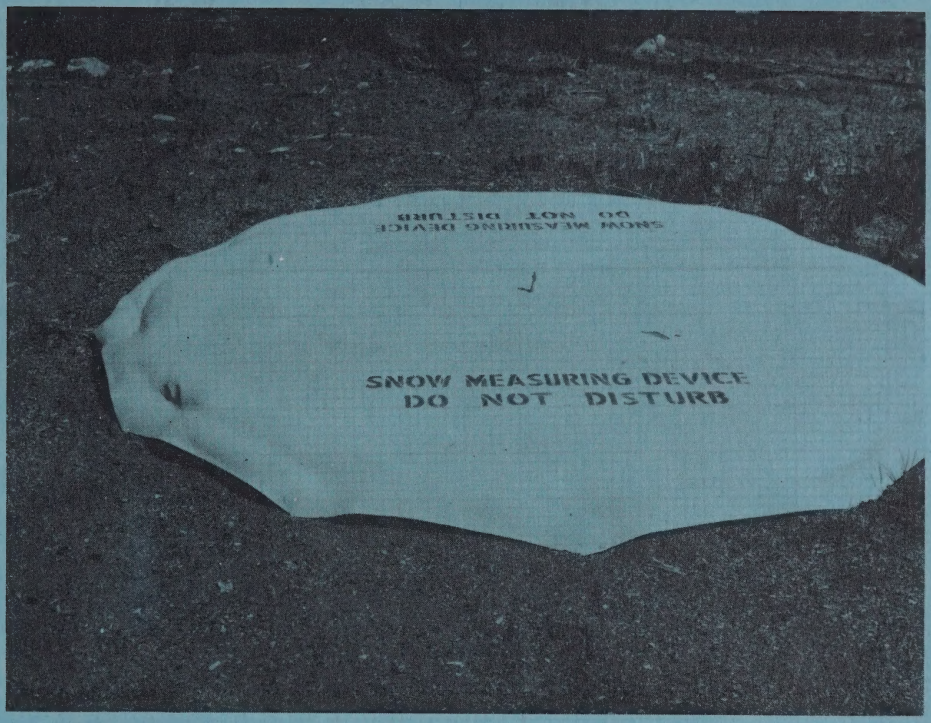
AS OF APRIL 30, 1967

(1000 Acre Feet)

NO.	RESERVOIR	USABLE CAPACITY	THIS YEAR	LAST YEAR	AVERAGE
1105	Ackley Lake	5.8		-	3.6
1165	Durand	7.0	5.8	7.0	5.9
1190	Martinsdale	23.1	9.2	16.7	10.6
1225	Deadman's Basin	72.2	55.9	66.6	45.1

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD).

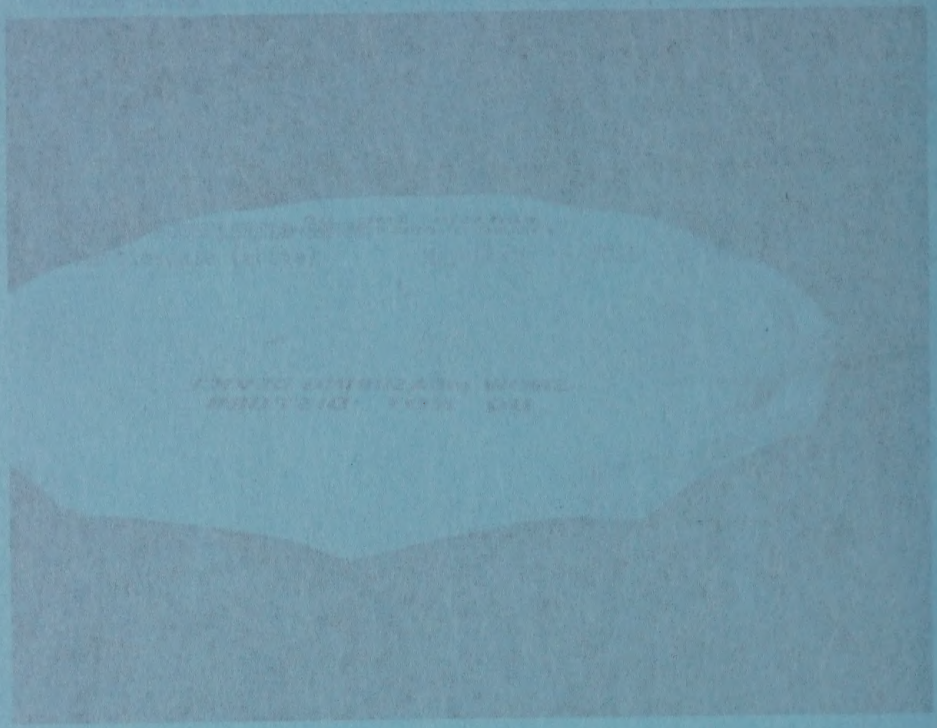
THE SNOW PILLOW



Snow Pillow installation at Lick Creek, Montana

During the past few years the Soil Conservation Service has tested snow measuring devices for obtaining a continuous record of snow accumulation and melt. The most versatile and promising is the nylon reinforced butyl or neoprene snow pillow, which is usually about 12 feet in diameter and filled with a methanol alcohol-water solution to a depth of three inches. The pillow is placed on a level ground surface. A hose connects the pillow to a manometer or pressure transducer in an instrument shelter. As snow falls on the pillow the amount of fluid rise in the manometer is equivalent to the water content in the snow pack. A water level recorder installed in the manometer provides a continuous record of the snow water content. Telemetered (transmitted by radio signal) information is obtained by connecting a pressure transducer to the pillow. The signal from the transducer is converted to equivalent inches of water content at the receiving station. Air temperature, total precipitation, soil moisture and soil temperature can be telemetered, in addition to snow water content.

USDA-SCS-PORTLAND, OREG. 1967

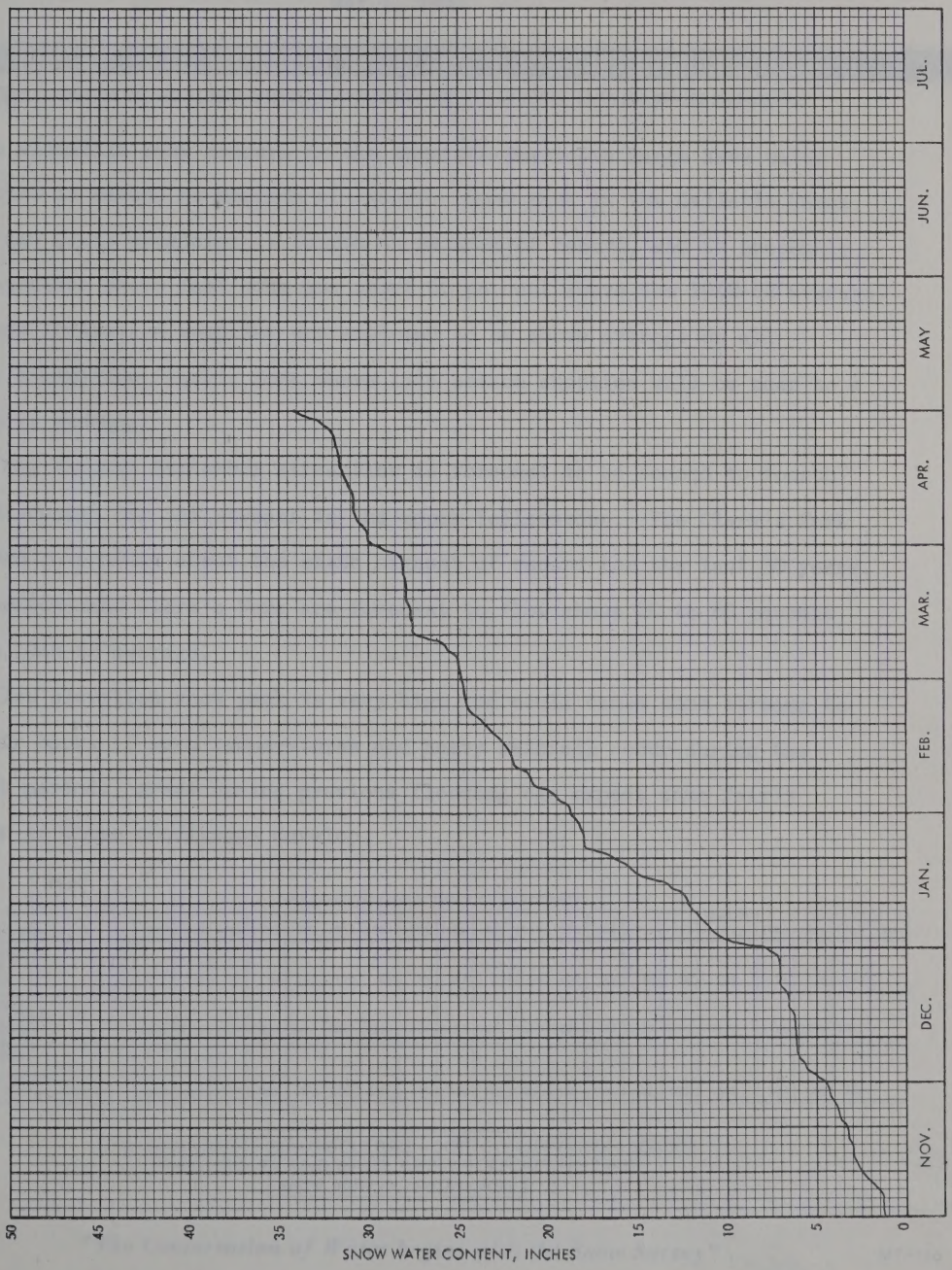


SPUR PARK
SNOW PILLOW DATA

AS OF MAY 1, 1967

Sec. 20 T. 12N R. 9E No. 10C06 Drainage: Judith

Lat. 46-47 Long. 110-37 Elev. 8000



WATER SUPPLY OUTLOOK
UPPER YELLOWSTONE RIVER BASIN
MONTANA

as of
MAY 1, 1967

UNITED STATES DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

Data included in this report were obtained in cooperation with other Federal, State and private organizations

High elevation snow courses in the Absaroka-Beartooth Range have water content that is second to maximum of record. Snow pack in the Gallatin Range, Bridgers and Crazy Mountains is fourth to maximum of record, and is presently about 75 percent above last year and about 60 percent above the 1948-62 average. Late season irrigation supplies are expected to be above average on all drainages except the Clark's Fork where late season supplies will be near to a little above average.

The May through September streamflow is forecast to be second to fourth highest of record for the streams in the upper Yellowstone. The Clark's Fork is expected to produce about the sixth highest of record for the last 30 years. The Yellowstone and Clark's Fork are forecast to flow about 20 to 60 percent above the 1948-62 average.

The low elevation snow pack is very high and could cause some streams to leave their banks if warm temperatures and heavy rainfall occur during the early melt period. Areas having previous flooding can expect some fairly high water if these conditions develop.

STREAMFLOW (APRIL THROUGH SEPTEMBER)

STREAM GAGING STA.	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1948-62 Average	1963	1964	1965	1966
STATION NO. 1935 SHIELDS RIVER AT CLYDE PARK	217	113	116	94	162	130	65	72	97	77	50	106	63	36	86	99	101	133	162	
STATION NO. 1925 YELLOWSTONE RIVER NEAR LIVINGSTON	2480	2216	2427	2474	2417	1820	2232	1621	2689	2272	1630	2098	1527	1440	2562	2127	2128	2392	2982	
STATION NO. 2075 CLARK FORK YELLOWSTONE RIVER AT CHANCE	588	564	713	757	576	519	600	419	716	715	487	648	386	442	622	583	593	602	763	

Report prepared by
U. S. DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE
SNOW SURVEY AND WATER SUPPLY FORECASTING UNIT
BOX 98, BOZEMAN, MONTANA 59715

"The Conservation of Water begins with the Snow Survey"

UPPER YELLOWSTONE RIVER BASIN

SNOW SURVEY DATA

WATERSHED 11

AS OF MAY 1, 1967

(Inches)

SNOW COURSE			CURRENT DATA			PAST RECORD	
						WATER CONTENT	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE
10C05	Bald Ridge	7500	5/2	49	17.7	10.0	-
10D15	Bridger Bowl Pillow	7250	4/28	SP	35.2	24.8	-
9D01	Camp Senia	7890	4/28	36	11.2	7.6	9.3*
10E03	Canyon	7750	4/28	60	24.1	12.8	13.5*
9D07	Cooke Station	8150	5/2	72	28.7	15.5	-
10D04	Devil's Slide	8100	5/1	89	30.2	22.2	24.9
10E06	East Entrance	7000	5/1	15	5.0	0.0	3.6*
9D06	Fisher Creek	9100	5/2	131	54.9	36.5	-
9D06	Fisher Creek Pillow	9100	5/2	142	53.6	-	-
9D05	Grizzly Peak	8400	5/3	91	22.8	21.6	18.2*
10D06	Independence	8000	4/26	64	26.7	12.9	17.7*
10E04	Lake Camp	7850	4/28	42	13.5	6.0	7.2*
9E01	Lodgepole	8200	5/3	54	16.7	7.6	10.7*
10E01	Lupine Creek	7300	5/1	45	16.6	3.5	7.7*
10D12	Monument Peak	9000	4/26	94	37.8	20.9	26.4*
10E02	Norris Basin	7500	5/2	41	14.7	0.0	5.5*
10D07	Northeast Entrance	7400	5/1	36	13.2	3.2	6.2
10D07	Northeast Entrance Pillow	7350	5/2	SP	13.7	-	-
10C03	Porcupine R.S.	6500	5/2	34	11.3	5.2	-
10D10	Sacajawea	6550	4/28	42	17.9	11.4	10.8*
10D16	Shower Falls Pillow	8100	5/1	SP	31.3	25.4	-
10C08	South Fork Shields	8100	5/2	85	33.6	26.3	-
10E05	Sylvan Pass	7100	5/1	39	17.0	9.0	10.6*
9D04	Timberline Creek	8850	4/28	60	23.8	16.9	16.7*
9D08	White Mill	8700	5/2	100	40.2	25.9	-

SP - Snow pillow observation - water content only.

SOIL MOISTURE DATA

AS OF MAY 1, 1967

(Inches)

SOIL MOISTURE STATION			SOIL PROFILE		CURRENT DATA		PAST RECORD	
NO.	NAME	ELEVATION	DEPTH	FIELD CAPACITY	DATE OF SURVEY	SOIL MOISTURE	LAST YEAR	**AVERAGE
10D11M	Battle Ridge	6020	48	17.6	5/2	15.0	15.6	15.5
10D15M	Bridger Bowl	7250	48	15.8	4/28	15.8	16.4	-
10D07M	Northeast Entrance	7350	48	9.4			-	7.7

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD). *ADJUSTED AVERAGE **AVERAGE FOR PERIOD OF RECORD

WATER SUPPLY FORECASTS

WATERSHED 11

AS OF MAY 1, 1967

(1000 Acre Feet)

NO.	RIVER AND FORECAST POINT	FORECAST PERIOD	FORECAST THIS YEAR	PERCENT AVERAGE	MEASURED FLOW LAST YEAR*	MEASURED FLOW AVERAGE
1915	YELLOWSTONE RIVER Corwin Springs (at)	May-Sept	2175	121	1410	1792
1925	YELLOWSTONE RIVER Livingston (near)	May-Sept	2525	125	1521	2019
1935	SHIELDS RIVER Clyde Park (at)	May-Sept	135	164	54.4	82.1
2000	BOULDER RIVER Big Timber (at)	May-Sept	470	142	219	330
2050	STILLWATER RIVER Absarokee (near)(25)	May-Sept	670	126	406	531
2075	CLARKS FORK RIVER Chance (at)	May-Sept	690	123	412	560
2085	CLARKS FORK RIVER Edgar (at)	May-Sept	710	123	405	578
2095	ROCK CREEK Red Lodge (near)	May-Sept	140	139	89.2	101
2145	YELLOWSTONE RIVER Billings (at)	May-Sept	4800	131	2702	3675

(25) Adjusted for storage in Mystic Lake.

*PROVISIONAL DATA FURNISHED BY U. S. GEOLOGICAL SURVEY

RESERVOIR STORAGE DATA

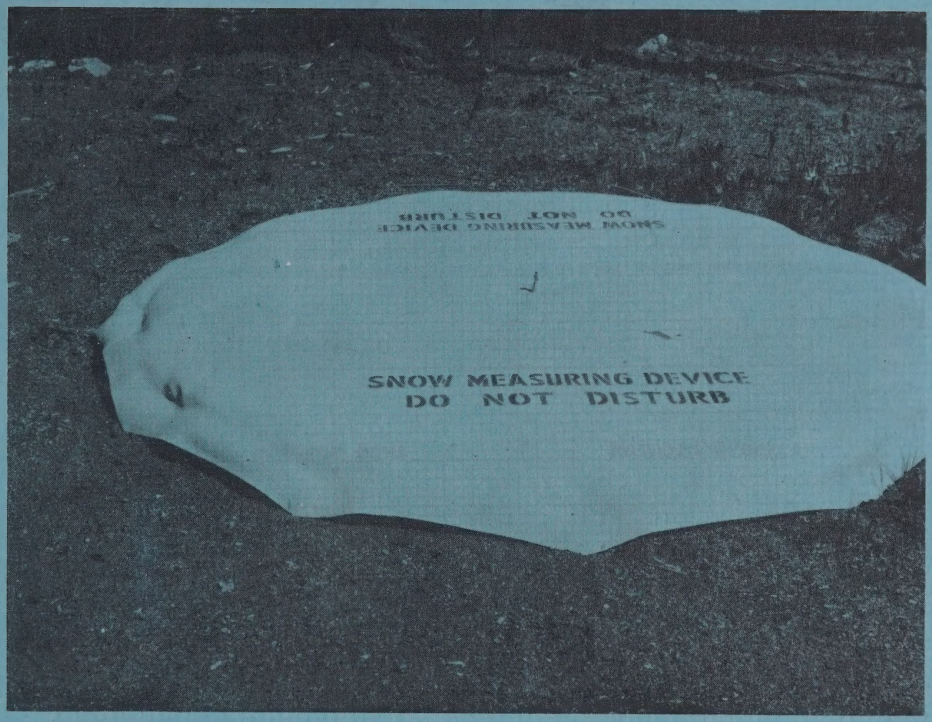
AS OF APRIL 30, 1967

(1000 Acre Feet)

NO.	RESERVOIR	USABLE CAPACITY	THIS YEAR	LAST YEAR	AVERAGE
2040	Mystic Lake	20.8	4.6	2.0	2.8
2120	Cooney	27.5	15.8	22.6	15.0

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD).

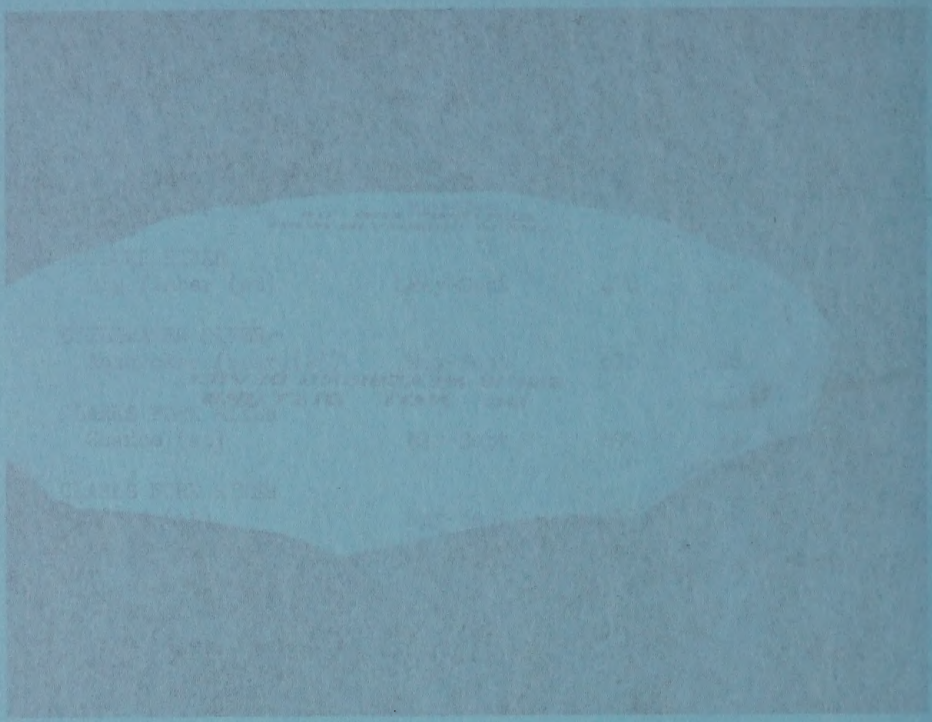
THE SNOW PILLOW



Snow Pillow installation at Lick Creek, Montana

During the past few years the Soil Conservation Service has tested snow measuring devices for obtaining a continuous record of snow accumulation and melt. The most versatile and promising is the nylon reinforced butyl or neoprene snow pillow, which is usually about 12 feet in diameter and filled with a methanol alcohol-water solution to a depth of three inches. The pillow is placed on a level ground surface. A hose connects the pillow to a manometer or pressure transducer in an instrument shelter. As snow falls on the pillow the amount of fluid rise in the manometer is equivalent to the water content in the snow pack. A water level recorder installed in the manometer provides a continuous record of the snow water content. Telemetered (transmitted by radio signal) information is obtained by connecting a pressure transducer to the pillow. The signal from the transducer is converted to equivalent inches of water content at the receiving station. Air temperature, total precipitation, soil moisture and soil temperature can be telemetered, in addition to snow water content.

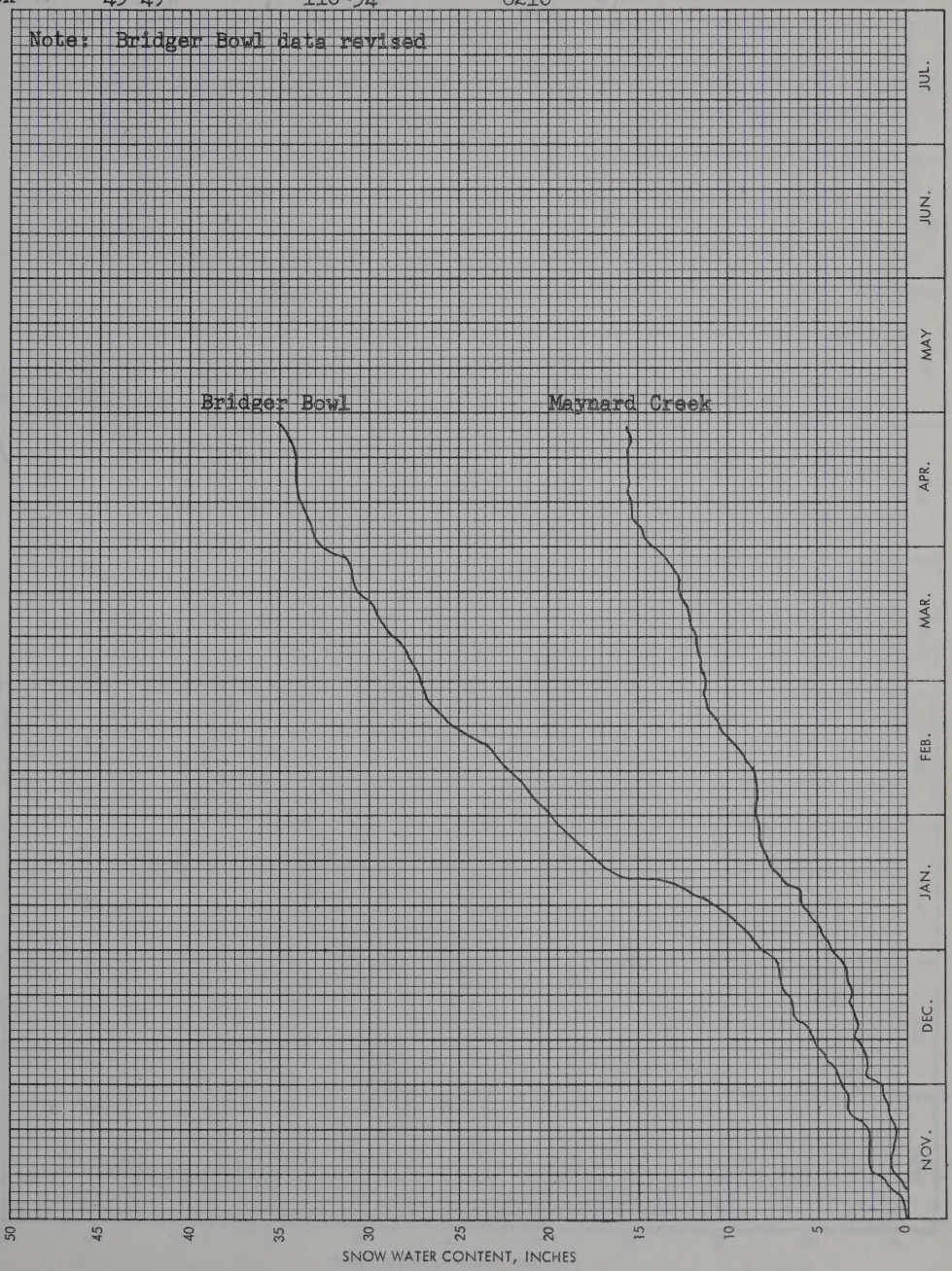
USDA-SCS-PORTLAND, OREG. 1967



BRIDGER BOWL & MAYNARD CREEK
SNOW PILLOW DATA

AS OF MAY 1, 1967

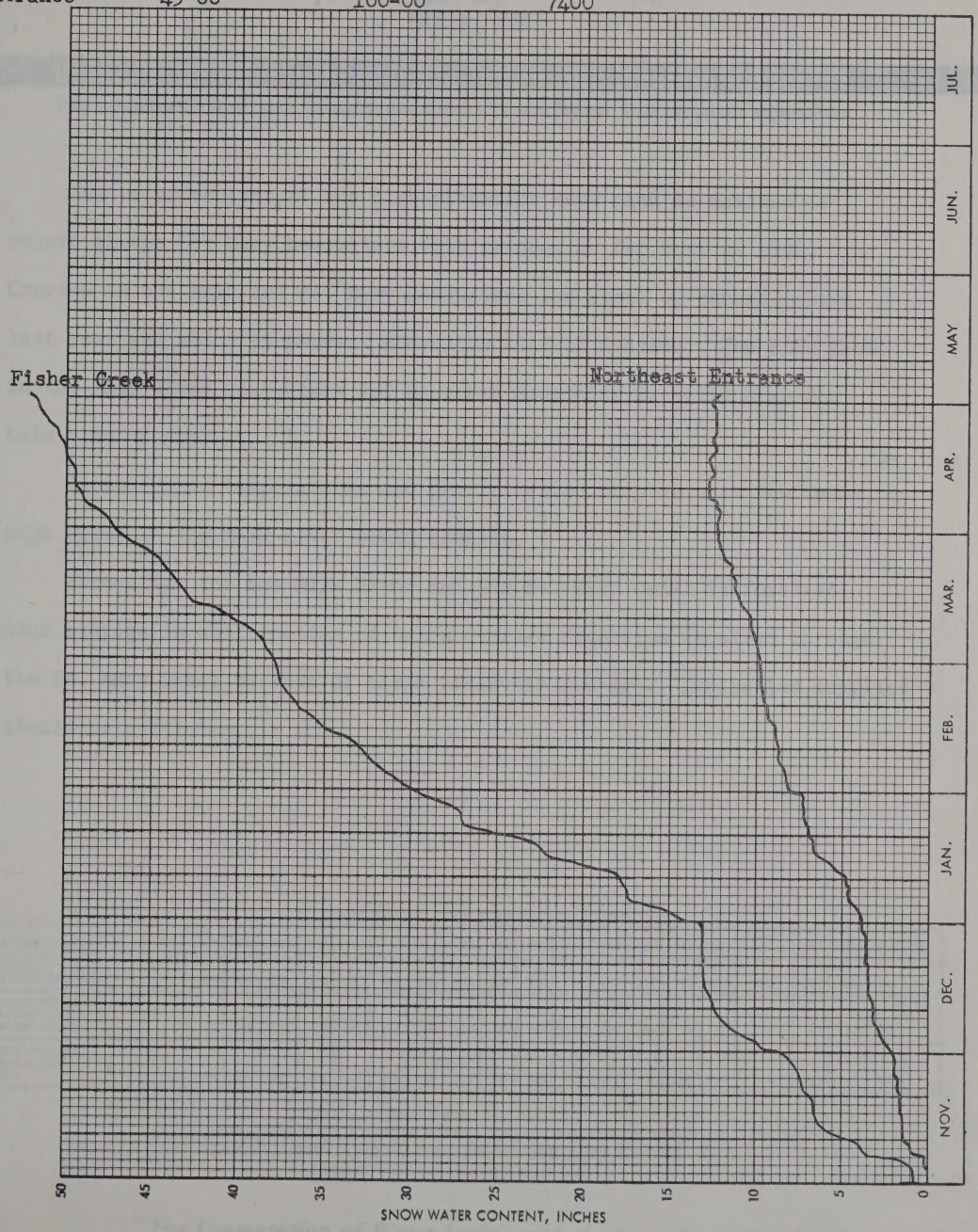
Bridger Bowl -	Sec.	25	T.	1N	R.	6E	No.	10D15	Drainage: Gallatin
Maynard Creek -		19		1N		7E		10D18	
Bridger Bowl -	Lat.	45-48			Long.	110-55	Elev.	7250	
Maynard Creek -		45-49				110-54		6210	

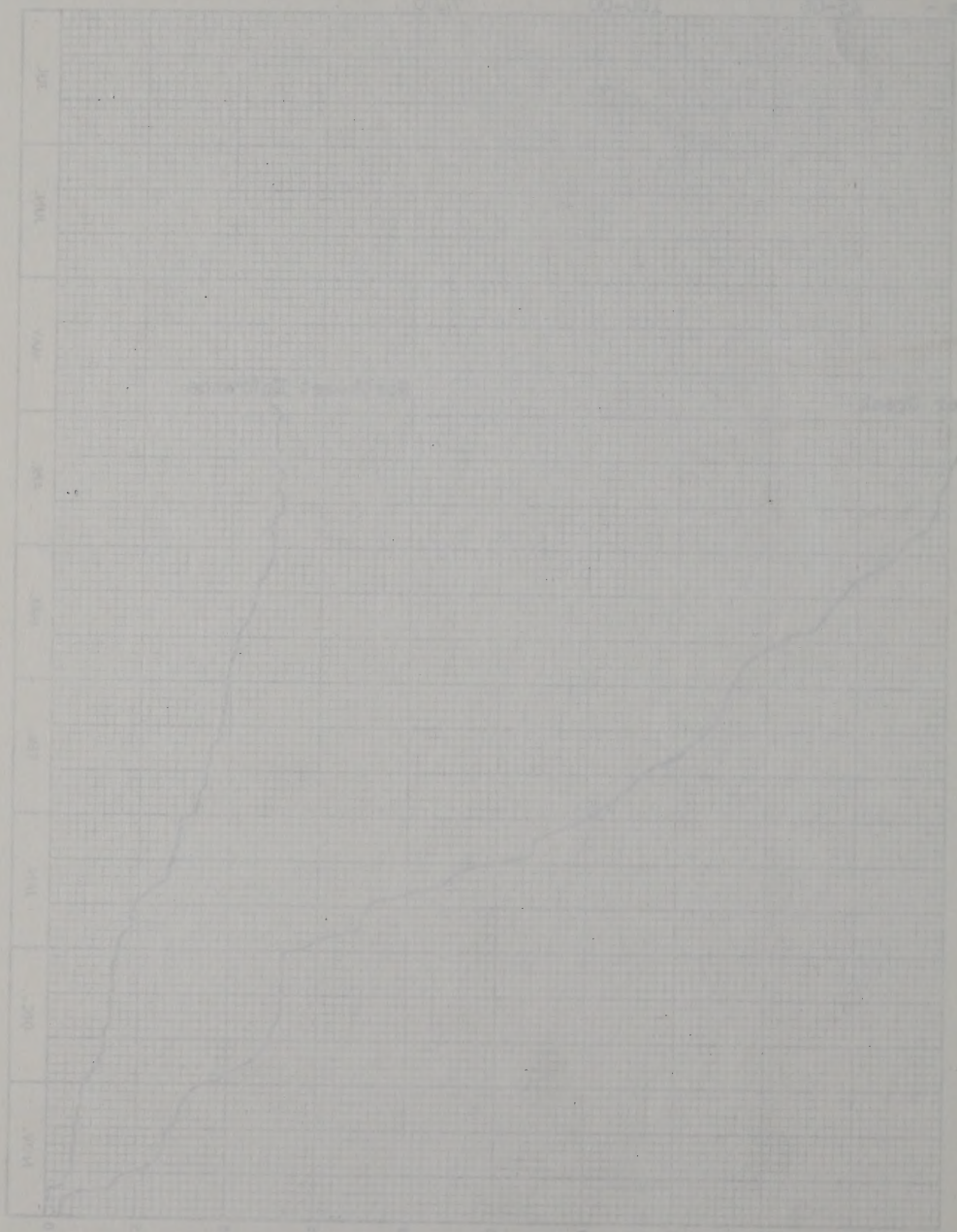


FISHER CREEK & NORTHEAST ENTRANCE
SNOW PILLOW DATA

AS OF MAY 1, 1967

Fisher Creek -	Sec. 11	T. 9S	R. 14E	No. 9D06	Drainage: Yellowstone
N.E. Entrance -	33	9S	14E	10D07	
Fisher Creek -	Lat. 45-04	Long. 109-57	Elev. 9100		
N.E. Entrance -	45-00	100-00	7400		





WATER SUPPLY OUTLOOK

MILK RIVER BASIN

MONTANA

as of
MAY 1, 1967

UNITED STATES DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

Data included in this report were obtained in cooperation with other Federal, State and private organizations

The water content of the high elevation snow pack is maximum of record in the St. Mary headwaters with records as far back as 1922. Courses in the Milk and St. Mary headwaters are about 60 percent above last year and about 55 percent above the 1948-62 average. The snow pack in the Milk River headwaters and Bear Paw Mountains is still high for this time of year.

Depending on temperatures and precipitation for the next few weeks, high flows in the Milk River could develop.

Streamflow for the Milk River and the St. Mary Canal is forecast near average in anticipation of below average diversion required through the St. Mary Canal because of large reservoir storage. Irrigation supplies should be sufficient.

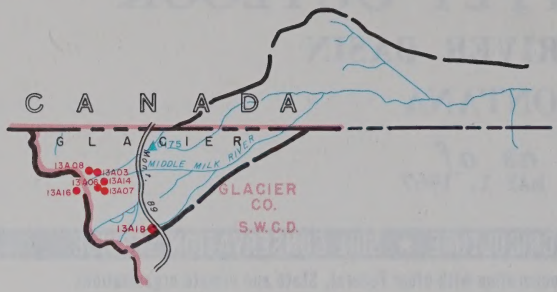
STREAMFLOW (APRIL THROUGH SEPTEMBER)

STREAM GAGING STA.	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1948-62 Average	1963	1964	1965	1966
MILK RIVER AT EASTERN CROSSING	304	190	223	312	227	359	232	255	255	230	259	275	217	209	212	250	227	280	332	
RESERVOIR STORAGE SUM FRESNO AND NELSON ON APRIL 1	110	108	24	116	182	115	124	124	132	160	111	129	184	74	53	116	92	67	118	
SUM STREAMFLOW AND RESERVOIR STORAGE	414	298	247	428	409	474	356	279	387	390	370	404	401	283	265	366	319	347	450	

Report prepared by
U. S. DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE
SNOW SURVEY AND WATER SUPPLY FORECASTING UNIT
BOX 98, BOZEMAN, MONTANA 59715

"The Conservation of Water begins with the Snow Survey"

MILK RIVER BASIN

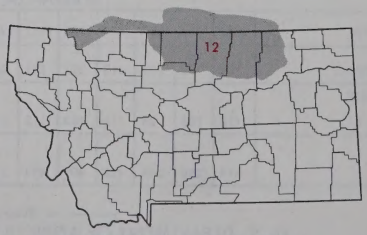


N

25 0 25 50
SCALE IN MILES

LEGEND

- Snow Survey Course
- Soil Moisture Station
- Snow Course and Soil Moisture Station
- Aerial Marker at Snow Course
- Stream Gaging Station
- Drainage
- S.W.C.D. Boundary
- Watershed Boundary
- Highway
- Town
- County Boundary
- State Boundary



WATERSHED LOCATION

SNOW SURVEY DATA

WATERSHED 12

AS OF MAY 1, 1967

(Inches)

SNOW COURSE			CURRENT DATA			PAST RECORD	
						WATER CONTENT	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE
13A18	Hudson Bay Divide	5800	5/1	84	29.4	17.5	-
13A03	Iceberg Lake No. 3	5600	5/3	114	51.0	28.3	29.6
13A14	Josephine Lower No. 9	4900	5/2	80	32.8	18.9	17.9*
13A05	Marias Pass	5250	4/26	63	25.9	14.0	18.0
13A16	Mineral Creek	4000	5/1	53	23.2	9.4	-
13A07	Mount Allen No. 7	5700	5/2	150	72.9	47.8	49.2
13A06	Piegan Pass No. 6	5500	5/2	135	59.4	42.6	41.3
13A08	Ptarmigan No. 8	5800	5/3	133	59.8	36.1	40.3

SOIL MOISTURE DATA

AS OF MAY 1, 1967

(Inches)

SOIL MOISTURE STATION			SOIL PROFILE		CURRENT DATA		PAST RECORD	
NO.	NAME	ELEVATION	DEPTH	FIELD CAPACITY	DATE OF SURVEY	SOIL MOISTURE	LAST YEAR	**AVERAGE
13A05M	Marias Pass	5250	54	6.5	5/1	5.8	-	6.0

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD). *ADJUSTED AVERAGE **AVERAGE FOR PERIOD OF RECORD

WATER SUPPLY FORECASTS

WATERSHED 12

AS OF MAY 1, 1967

(1000 Acre Feet)

NO.	RIVER AND FORECAST POINT	FORECAST PERIOD	FORECAST THIS YEAR	PERCENT AVERAGE	MEASURED FLOW LAST YEAR*	MEASURED FLOW AVERAGE
	ST. MARY RIVER					
0175	Babb (near)(30)	May-Sept	630	134		468
	MILK RIVER					
1350	Eastern Crossing (at)	May-Sept	210	102	230	206

(30) Adjusted for storage in Lake Sherburne.

*PROVISIONAL DATA FURNISHED BY U. S. GEOLOGICAL SURVEY

RESERVOIR STORAGE DATA

AS OF APRIL 30, 1967

(1000 Acre Feet)

NO.	RESERVOIR	USABLE CAPACITY	THIS YEAR	LAST YEAR	AVERAGE
1365	Fresno	127.2	125.8	128.1	108.1
1550	Nelson	66.8	58.0	58.9	39.8

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD).